School to Work
CREATING FUTURE PATHWAYS

Vocational Learning in **Science**

NEW SOUTH WALES
DEPARTMENT
OF EDUCATION
AND TRAINING

Vocational Education in Schools Directorate

Vocational Learning in Science

"When students leave school, they should have employment related skills and an understanding of the work environment, career options and pathways as a foundation for, and positive attitudes towards, vocational education and training, further education, employment and life-long learning".

Adelaide Declaration on National Goals for Schooling in the Twenty-First Century (1999)

School to Work
CREATING FUTURE PATHWAYS

Acknowledgements

The Vocational Education in Schools Directorate acknowledges the work of all contributors who provided advice and material that helped shape the content of this resource.

Produced by:

Vocational Education in Schools Directorate
NSW Department of Education and Training
Level 1, 1 Oxford Street
Darlinghurst NSW 2010

© NSW Department of Education and Training
(Vocational Education in Schools Directorate) 2005

All rights reserved. Except under the conditions described in the *Copyright Act 1968* and subsequent amendments, no part of this publication may be reproduced by any process without permission in writing from the publisher.

NSW schools may photocopy any part of this publication for use by teachers within NSW Government schools.

ISBN 0731384032
SCIS 1213456

Contents

1 Vocational and Enterprise Learning in Science

1.1 Introduction 1
1.2 *School to Work: Creating Future Pathways 2005-2007* 1
1.3 Enterprise learning in Science 2
1.4 Quality teaching in NSW public schools 3
1.5 Assessment for learning 3
1.6 Vocational learning syllabus links in the Science curriculum 3
1.6.1 *Work, Employment and Enterprise* in the Science Years 7-10 syllabus 3
1.6.2 *Key Competencies* in the Science Years 7-10 syllabus 3
1.6.3 *Key Competencies* in the Science Stage 6 syllabus 4
1.6.4 Vocational learning outcomes in Science Stage 6 4

2 Employment Related Skills in the Classroom

2.1 Employment related skills 5
2.1.1 Identifying employment related skills – a questionnaire for teachers 6
2.1.2 Examples of employment related skills developed in Science Stages 4, 5 and 6 7
2.1.3 Sample unit of work annotated with employment related skills 9
2.2 *The Employment Related Skills Logbook* 15
2.2.1 Why use the logbook? 15
2.2.2 What's new in the 2005 logbook? 16
2.2.3 *The Employment Related Skills Logbook* overview 17
2.2.4 Models of logbook implementation in schools 23
2.2.5 Teacher examples: Logging employment related skills in the classroom 24
2.2.6 Teacher activity: Logging employment related skills in the classroom 31

3 Student Vocational Learning Activities

3.1 Science student activities 33
3.1.1 Education and Training Pathways 34
3.1.2 Education and Training Pathways for a career relating to Science 35
3.1.3 Science reporter for a day 36
3.2 Science teaching unit: Staying Healthy 37

4 Education and Training Pathways in Science

4.1 Credit transfer arrangements 61
4.1.1 Credit transfer arrangements: HSC to TAFE NSW 61
4.1.2 HSC Science courses and credit transfer arrangements 62
4.1.3 *School Statement of Achievement* forms 63
4.1.4 Credit transfer from TAFE NSW to university 64
4.2 Traineeships and apprenticeships 65
4.2.1 School Based Traineeships in NSW schools 66

5 Vocational and Enterprise Learning Resources

5.1 Employment related skills and their elements 67
5.1.1 Employment related skills mapping 73
5.2 Vocational learning resources for teachers and students 74
5.2.1 *myfuture.edu.au* 77
5.2.2 *The Real Game Series* 78
5.2.3 *Links to ReCaP* 79
5.3 Enterprise resources and activities 80
5.4 *Teachers in Business* – an opportunity for teachers 82

1. Vocational and Enterprise Learning in Science

"Career building skills should not be taught as a separate subject but should be integrated with other curriculum subjects, such as maths, history ... Why are we learning these subjects if not to prepare for the rest of life? Let's put a context around these subject areas that adds greatly to the learning experience."

Phil Jarvis (2002)
Vice-President, Canadian Work/Life Centre

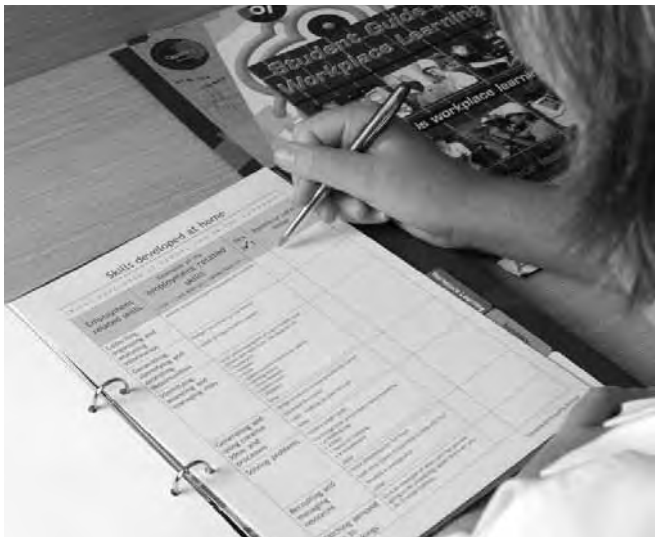
1.1 Introduction

Vocational learning is learning that addresses broad understandings of the world of work and develops in young people a range of knowledge, skills, competencies and attributes relevant to a wide range of work environments. Vocational learning provides students with the opportunity to make connections between school and the world beyond it.

Vocational Learning in Science is a curriculum support tool for secondary school teachers within the Science key learning area. This resource supports teachers in implementing the Science Years 7-10 and Stage 6 syllabuses to identify and provide a range of opportunities for students to articulate the relevance of their curriculum learning to personal growth and future careers.

Vocational Learning in Science also provides teachers with information and teaching strategies to support the implementation of the *Employment Related Skills Logbook*.

This booklet updates the existing *Vocational Learning in Science* booklet provided to teachers in 2003.



1.2 *School to Work: Creating Future Pathways 2005-2007*

School to Work: Creating Future Pathways extends and builds on the successes of the *School to Work Program* implemented between 1999-2003 as part of the NSW Government commitment to support students in transition from school to post-school education, training and employment destinations.

School to Work: Creating Future Pathways recognises the impact on young people's life decisions in a world where ideas about work and practices in the workplace are changing rapidly. Students need to develop employment related skills and enterprising attributes that can be applied to a range of jobs and careers, and to be prepared to engage in lifelong learning.

School to Work focuses on four priority areas:

- Planning Transition Pathways
- Exploring Career Futures
- Strengthening Student Outcomes through Vocational Learning
- Building Networks and Connections.

1.3 Enterprise learning in Science

Enterprising students possess the drive and commitment to identify, initiate, be resourceful and manage activities that are real and relevant to them both within school and the wider community. Enterprise learning develops students' personal and employment related attributes including the ability to be innovative and to successfully manage change.

The Enterprise Education Action Research (EEAR) project funded by the Australian Government (2002/2004) highlighted that ... *the focus of enterprise education should be on students' learning as enterprising people, rather than on activity alone*.

Therefore, students will be encouraged to be enterprising when they are provided with opportunities of:

- **Student ownership** – students are given opportunities to have greater control of the learning experience rather than having decisions made for them, for example – negotiating tasks and related assessment criteria. This involves making the learning environment as real as possible so that students will become actively involved in and own what is occurring.
- **Experiential learning** – activities that allow students to learn by 'doing' both inside and outside the classroom. This will combine classroom learning and participation in the broader school community.
- **Cooperative learning** – students learn with and from each other including working in teams both inside and outside school boundaries. This includes the ability to exercise personal and shared responsibility, rather than being dependent on the teacher to solve problems and resolve issues.
- **Reflective practice** – opportunities for evaluation need to be built into the learning outcomes of the activity so students learn from their experiences.

In this respect, enterprise learning is not something new but something that needs to be made **more explicit** to students as they are learning, and needs to be **integrated into normal classroom practice**. In this way, students will be able to apply their wider school learning to real life situations thus making learning more authentic, relevant and engaging.

Effective partnerships between schools, parents, local business and industry are a key factor in the success of enterprise learning. The support and engagement of business and communities provide students with the opportunity to put their enterprising skills into practice.

Examples of enterprise learning in Science courses could include students:

- participating in community projects for environmental benefit such as Streamwatch or Landcare projects
- planning and implementing an environmental project such as regenerating local fish or frog populations, in cooperation with Taronga Zoo or the National Parks and Wildlife Service
- undertaking the *Young Achievement Australia Business Enterprise Program* which involves student teams forming companies to market goods – choosing products at the cutting edge of scientific research
- operating a school-based service business based on scientific equipment – for example, testing radiation from microwave cookers
- participating in scientific projects such as Questacon, National Science Competitions, University Science weeks
- setting up and operating a school-based business – for example, producing horticultural/agricultural products
- setting up a practice firm within the Australian Network of Practice Firms, mentored by a Science industry company, to sell virtual scientific products, planning and operating scientific research projects of benefit to the local community
- conducting a science information seminar and expo
- organising an environment challenge.

List some examples of enterprise learning that your students are involved in/could be involved in:

My students are involved in/could be involved in:

Further information and student activities are provided in the *Employment Related Skills Logbook*.

1.4 Quality teaching in NSW public schools

Vocational Learning in Science assists teachers to improve student outcomes by supporting the *Quality teaching in NSW public schools* model of pedagogy. It provides teachers with ideas, approaches, tools, resources and support materials that promote high levels of **intellectual quality**, a high **quality learning environment** and **significance** by connecting students with authentic learning contexts.

1.5 Assessment for learning

Vocational Learning in Science provides support for teachers to plan and implement effective assessment for learning strategies. This includes the use of contemporary assessment strategies which are evidence-based and which help make learning more meaningful and important to students.

Student self-assessment and peer-assessment opportunities are encouraged through the use of tools such as the *Employment Related Skills Logbook* and activities from *The Real Game Series* – for example. Also encouraged are assessment strategies that involve authentic learning contexts that connect students with their world.
Such strategies could include enquiry-based research assignments and projects and fieldwork activities involving students in work-based and community-based learning.

1.6 Vocational learning syllabus links in the Science curriculum

1.6.1 *Work, employment and enterprise* in the Science Years 7-10 syllabus

The NSW Board of Studies has included cross-curriculum content and student learning outcomes for *Work, Employment and Enterprise* in all new Years 7-10 syllabuses, including Science. By addressing *Work, Employment and Enterprise* content, Science teachers can assist students to develop important knowledge, understanding, skills, values and attitudes about work, employment and the workplace. Students can also be encouraged to engage with enterprise, service, community and work-based learning opportunities. *Vocational Learning in Science* supports Science teachers in addressing these syllabus outcomes.

1.6.2 *Key Competencies* in the Science the Years 7-10 syllabus

Key Competencies are generic competencies essential for effective participation in existing and emerging learning for future education, work and life. They are embedded in the NSW Board of Studies Science Years 7 -10 syllabus.

The *Key Competencies* are:

- planning and organising activities
- collecting, analysing and organising information
- communicate ideas and information
- solving problems
- using technology
- working individually and in teams
- using appropriate mathematical processes.

Students will develop specific skills in working scientifically through:

- planning investigations
- conducting investigations
- communicating information and understanding
- developing scientific thinking and problem-solving techniques
- working individually and in teams.

1.6.3 *Key Competencies* in the Science Stage 6 syllabus

The *Key Competencies* are embedded in the Science Stage 6 subjects listed below.

- Biology – page 18
- Chemistry – page 18
- Physics – page 17
- Senior Science – page 18

The *Key Competencies* embedded in the Science Stage 6 syllabus to enhance student learning are:

- collecting, analysing and organising information
- communicating ideas and information
- planning and organising activities
- working with others and in teams
- using mathematical ideas and techniques
- solving problems
- using technology.

Practical experiences in the Earth and Environmental Science Stage 6 syllabus have been designed to utilise and further develop students' expertise in each of the following skill areas:

- planning investigations
- conducting investigations
- communicating information and understanding
- developing scientific thinking and problem-solving techniques
- working individually and in teams.

1.6.4 Vocational learning outcomes in Science Stage 6

Science Stage 6 supports vocational learning outcomes by:

- providing students with knowledge, understanding and skills that form a valuable foundation for a range of courses at university and other tertiary institutions
- assisting students to prepare for employment and full and active participation as citizens
- providing opportunities for students to gain recognition in vocational education and training
- providing students with the opportunity to apply investigative and problem-solving skills
- providing students with the opportunity to effectively communicate
- encouraging students to develop a range of practical skills including the use of current instrumentation, information technology and an increased ability to communicate understanding
- developing in students positive values about and attitudes toward themselves, others and learning as a lifelong process.

2. Employment Related Skills in the Classroom

"People will have a portfolio, individually managed careers … Employees will also have to cultivate more transferable skills … and be constantly re-training."

Dr Jim Bright, University of NSW (2004)

2.1 Employment related skills

Employment related skills are generic skills which are transferable to the ever-changing work environment. These skills are developed throughout a person's life and in multiple settings, including work and life settings and educational contexts. Nine skills have been identified in the *Employment Related Skills Logbook*. They are:

Self-management	**Communication**	**Problem solving**
Initiative and enterprise	**Teamwork**	**Technology**
Learning	**Planning and organising**	**Cross-cultural understanding**

Employment related skills are highly valued by employers. Education programs that emphasise these skills offer students a comparative advantage in the labour market. These skills also support young people in becoming active citizens in their community.

Each teacher has a role to play in helping young people develop their employment related skills. For more information, the guide *5.1 Employment related skills and their elements* has been developed to support classroom teachers in identifying the employment related skills students are able to demonstrate by participating in curriculum activities.

2. Employment Related Skills in the Classroom

2.1.1 Identifying employment related skills – a questionnaire for teachers

Are you already teaching employment related skills in the classroom?

Students gain a variety of employment related skills in every subject. Complete this questionnaire to identify employment related skills you are already teaching to your students.

Do your students develop any of these skills in your classroom?
Tick and add to the list below.

Self-management

(✓) Are you teaching your students to:

- ❑ have clear personal goals and strategies
- ❑ be task-orientated and outcomes focused
- ❑ show interest, initiative and effort
- ❑ seek advice and support when required
- ❑ be pro-active in career planning, time management and setting challenges.

Initiative and enterprise

(✓) Are you teaching your students to:

- ❑ identify opportunities
- ❑ develop a strategic, creative, long-term vision
- ❑ show independence and initiative in identifying problems and solving them
- ❑ enjoy the challenge of new experiences.

Learning

(✓) Are you teaching your students to:

- ❑ learn in any setting
- ❑ identify and access learning sources and opportunities
- ❑ use a range of mediums to learn including mentors, peers, networking and information technology
- ❑ acknowledge the need to learn in order to accommodate change.

Communication

(✓) Are you teaching your students to:

- ❑ speak to a group confidently
- ❑ speak and write in another language
- ❑ follow verbal instruction
- ❑ select the appropriate communication form and style
- ❑ use verbal and non-verbal modes of communication.

Teamwork

(✓) Are you teaching your students to:

- ❑ understand how to operate in teams
- ❑ recognise and respect people's diversity, individual differences and perspectives
- ❑ establish group goals
- ❑ manage and resolve conflict when appropriate.

Planning and organising

(✓) Are you teaching your students to:

- ❑ take initiative and make decisions
- ❑ manage time and priorities
- ❑ establish clear project goals and deliverables
- ❑ collect, analyse and organise information, using appropriate methods.

Problem solving

(✓) Are you teaching your students to:

- ❑ anticipate, identify, clarify and frame problems
- ❑ develop and explore practical solutions
- ❑ analyse and assess information and situations
- ❑ implement solutions.

Technology

(✓) Are you teaching students to:

- ❑ gain a range of basic information technology skills
- ❑ manage and use technology
- ❑ understand the social implications of technology.

Cross-cultural understanding

(✓) Are you teaching your students to:

- ❑ understand and respect cultural and community diversity
- ❑ work with people of different ages, gender, race, religion
- ❑ show respect and concern for others
- ❑ interact with sensitivity and empathy.

2.1.2 Examples of employment related skills developed in Science Stages 4, 5 and 6

Students gain a variety of valuable employment related skills in every subject they study. Here are some examples of employment related skills developed by students studying Science courses in Stages 4-6.

Employment Related Skills	Students can … /Students are able to … /Students know how to …
Self-management Ability to take responsibility for setting and achieving personal goals	• work independently to complete investigations • develop skills in decision making about ethical issues concerning society and science • identify individual strengths in scientific skills • set realistic goals to develop science skills and capabilities • respect differing viewpoints on science issues and be honest, fair and unbiased.
Initiative and enterprise Ability to seek/take advantage of opportunities	• use creative ideas to present scientific information or concepts • initiate further discussion or investigations that extend beyond what is required • adapt to changes as they arise • identify current areas of scientific research and development that have the potential to revolutionise current practices.
Learning Ability to achieve new skills and/or knowledge	• use ideas and concepts developed in Science to generate solutions for identified problems • use of inference, deductive and inductive reasoning and lateral thinking • develop knowledge of career opportunities in science-related areas • recognise one's own learning style in relation to understanding and gaining knowledge of scientific concepts.
Communication Ability to express and understand information	• explicitly communicate information and understanding in a written and/or oral report • use a variety of pictorial representations and graphs to show relationships and present information clearly and scientifically • extract relevant information from graphs, tables, flow diagrams and other resources.
Teamwork Ability to work effectively with others to get things done	• work cooperatively in teams to solve an identified scientific problem • implement strategies to work effectively as a member of a team • explain why an investigation or task is best undertaken individually or as a part of a team • respect different ideas/points of view • negotiate task structure and parameters • negotiate the allocation of roles and responsibilities within the team • monitor the progress of a team towards completing a task.

2. Employment Related Skills in the Classroom

Employment Related Skills	Students can … /Students are able to … /Students know how to …
Planning and organising Ability to coordinate and prioritise tasks and resources	• design and trial procedures to undertake scientific investigations • plan investigations that allow valid and reliable data to be collected • explain why a procedure, a sequence of procedures or repetition of procedures is essential in science • identify and set up appropriate equipment needed to undertake an investigation • summarise and collate information from a range of resources • evaluate the relevance of first-hand and secondary information and data in relation to the area of investigation.
Problem solving Ability to identify problems and develop solutions	• analyse information to make and justify generalisations • identify and explain the nature of a problem • evaluate and analyse the appropriateness of different strategies for solving an identified problem • carry out a risk assessment • efficiently undertake the planned procedure to minimise hazards and wastage of resources • dispose of carefully and safely any waste materials produced during the investigations • identify and use safe work practices during investigations • recognise where and when modifications are needed and analyse the effect of these adjustments • respond quickly, safely and appropriately when accidents occur.
Technology Ability to use appropriate technologies to complete tasks	• identify appropriate technology that could be used during investigations and determine its suitability and effectiveness for its potential role in the procedure or investigations • identify and use appropriate technology to collect data, for example data loggers and sensors • use the Internet to access scientific information.
Cross-cultural understanding Ability to respect diversity and act without discrimination	• respect the cultural diversity of the Australian community and how this may impact on some scientific investigations • explore and work with different perspectives of individuals and groups in our society.

2.1.3 Sample unit of work annotated with employment related skills

As you can see from completing the previous questionnaire, you are already teaching employment related skills in your classroom. The next step is to make it explicit in your current teaching programs. A simple way to start is to annotate a current teaching program with employment related skills. Below is a sample unit developed for the Science Unit, Curriculum K-12 Directorate showing annotated employment related skills for you to use as a guide.

The Cave Environment

Context

Since early times, caves have been places of mystery, art, accommodation and adventure. For students, they still hold some of these fascinations. In this unit the Cave environment is used to investigate the geology of limestone, chemistry of calcium carbonate, the environmental impacts of mining limestone for cement and the impacts of human visitation on caves. Caves contain a rich fauna that can essentially be treated as a closed system for investigation, the energy input into the cave consists mainly of guano from the bats and debris brought into the caves via extreme events like flooding. This topic provides the opportunity for visits to cave systems with guided tours provided by the Department of Tourism and field work investigating the geomorphology of areas covered by soluble rock. Caves in Australia have been essential in the science of palaeontology, providing fossil evidence for past environments and fauna. Riversleigh and Naracoorte are two examples of cave environments that have trapped fossil evidence of a particular time in the past.

Major syllabus references

Prescribed Focus Areas:	**Models, theories and laws**:	**Skills**:	**Values and attitudes:**
Nature and practice of science	Evolution and Natural Selection 5.8.3 a, b	5.14	5.25, 5.26, 5.27
Describes the processes that are applied to test and validate models, theories and laws. 5.2 a, b	**Structures and systems:**	5.15	
	Compounds and reactions 5.7.3 a, b, c, e	5.16	Possible student project
	Natural events 5.9.4 a, b, c	5.17	
Implications of science for society and the environment	**Interactions:**	5.18	
Discusses evidence supporting different viewpoints 5.4 c, d, e	Ecosystems 5.10 a, b, c, d	5.22	
	Resources 5.11.1 b. 5.11.2 a		

Approaches to learning and teaching

Students gather information about the various aspects of the cave environment. They perform practical activities on cave chemistry, identification of limestone and the fossils it contains, and practical activities related to the human uses of limestone in cement, agriculture and industry. The activities support various teaching strategies including group work, teacher led instruction or a stations approach. Access to the Internet and the library would be a benefit to the learning in this topic as would the opportunity for an excursion to limestone caves and cement mining areas. The topic could conclude with the preparation of a script for a cave guide to give to a school group on a tour.

Key references

Science in Perspective Book 4 p333-336; www.ucmp.berkeley.edu/fosrec/TimeScale.html;
Fossils and dating www.ucmp.berkeley.edu/fosrec/BarBar.html; Wind cave www.nps.gov/wica/speleoth.htm;
Sinkholes http://emerald.ucsc.edu/~jsr/EART10/Trips/FT2/sinkhole.html;
Hazards of karst www4.wittenberg.edu/academics/geol/progcrs/geol220/porter/index.shtml;
Equilibrium in caves http://chemlinks.beloit.edu/modules/caves_progress.html;
Kentucky caverns www.kdu.com/chem.html; Mining and uses www.continentallime.com/lime.html;
Biospeleology www.utexas.edu/depts/tnhc/.www/biospeleology/photos.htm;
www.umsl.edu/~joellaws/ozark_caving/mss/cavefish.htm; http://wasg.iinet.net.au/clife.html;
www.saske.sk/cave/slkslkzool.html;
Cave links www.cancaver.ca/bio/biolinx.htm;
Chemlinks http://chemlinks.beloit.edu/modules/caves_progress.html;
Video "*Message in the Rocks*" UNSW Syd 1997
Chemtext, Alexander Boden, (Science Press, 1986, p486); CD: *Resources Working for the Right Balance* (NSW Minerals Council)

Specific content outcomes By the completion of this unit of work students should be able to:	**Teaching ideas and strategies**	**Resources**	**Assessment strategies**
5.9 relate the development of the universe and the dynamic structure of Earth to models, theories and laws and the influence of time	**LIMESTONE** • Write detailed descriptions of at least 5 samples of limestone (5.14) • Test limestone with acid and write a general word equation for reactions of acid with carbonate • Predict the likely environments in which limestone will form	Communication	Write a brief history of the formation of limestone
5.9.4 natural events to: b) describe conditions under which fossils form	• Identify some common fossils likely to be found in limestone and describe how they form • Create a geological time scale to a scale similar to 1mm=1MY and locate on it the major events in earth history	*Science in Perspective* Book 4 p333-336 (Use ticker timer tape)	
c) relate the fossil record to the age of Earth and the time over which life has been evolving	• Identify times in the geological time scale where various fossils can be found (including index fossils) and write them on the scale • Investigate the fossil finds at Riversleigh and Narracoorte and discuss how they were formed and what they tell us about the past environment of Australia.	Problem solving	
a) identify that geological history can be interpreted from the formation, by sediments, of horizontal layers in which the oldest are at the base and the youngest at the top.	• Observe some geological maps and interpret the limestone history from the map • Investigate the processes by which limestone can turn to marble (eg contact and regional metamorphism).	Planning and organising *Science in Perspective* Book 4 p314-318 Geological mapping	

Specific content outcomes By the completion of this unit of work students should be able to:	Teaching ideas and strategies	Resources	Assessment strategies
5.16 accesses information from a wide variety of secondary sources 5.17 explains trends, patterns and relationships in data and/or information from a variety of sources	**CAVES** • Students use the library and Internet to collect information on cave creation, structures and decoration. Students present information to the class on computer, on a poster or verbally. (5.18 b, c.)	Internet reference: Wind Cave tour Wombeyan, Jenolan or other local suitable cave environment	Computer, poster or verbal presentation
5.10 assesses human impacts on the interaction of biotic and abiotic features of the environment 5.10 ecosystems to: a) distinguish between biotic and abiotic features of the local environment	**Environmental Factors of Caves** • Students predict, identify and if possible measure the abiotic factors of the cave environment: – air flow – water flow – light – pH – salts – temperature		
b) describe the importance of cycles of materials in ecosystems 5.8.3 the theory of evolution and natural selection to: a) discuss evidence that present day organisms have developed from different organisms in the distant past b) relate natural selection to the theory of evolution	• Students identify the biotic factors of the cave environment by collecting photos of cave fauna and presenting them in either a computer presentation or poster showing the cycles of food • Students should use the theory of evolution by natural selection to explain the adaptations of the organisms to the cave environment: – vertebrates (eg bats) – invertebrates (eg insects) – microorganisms (eg fungi) – guano – debris	Internet reference: Biospeleology	Computer or poster presentation

Technology
Planning and organising

Planning and organising
Technology

Specific content outcomes By the completion of this unit of work students should be able to:	**Teaching ideas and strategies**	**Resources**	**Assessment strategies**
5.7.3 compounds and reactions to: a) identify that a new compound is formed by rearranging atoms rather than by creating matter b) classify compounds into groups based on common chemical characteristics c) construct word equations from observations and written descriptions of a range of chemical reactions e) qualitatively describe reactants and products in the following chemical reactions: i. combustion ii. corrosion iii. precipitation iv. acids on metals and carbonates v. neutralisation vi. decomposition 5.14 undertakes first-hand investigations independently with safety and competence 5.17 explains trends, patterns and relationships in data and/or information from a variety of sources	**Chemistry of caves: crystallisation / recrystallisation** • Students dissolve excess samples of powdered limestone in weak acid and then filter and allow to evaporate. Students should identify the chemical change and the physical change in the reaction • Students write generic equation for: Acid + Carbonate → Salt + CO^2 + Water • Acidity of carbon dioxide in water. (Students are posed the question about what causes limestone to dissolve. They should come to the conclusion that it is the air/rain, how can the air be acidic?) • Students identify acidic neutral and basic calcium compounds • Students test the pH of distilled water with universal indicator then using a drinking straw bubble breath containing CO^2 and watch the formation of carbonic acid as the indicator changes • Students write a description of how rain can dissolve limestone	Internet reference: Equilibrium in caves Internet reference: Chemlinks Problem solving	Practical report

Specific content outcomes By the completion of this unit of work students should be able to:	**Teaching ideas and strategies**	**Resources**	**Assessment strategies**
	• Students investigate the history of cement. They will: – Discuss the carbonate/oxide and hydroxide reactions to create lime from $CaCO^3$ – Heat powered calcium carbonate to make lime. – Add drops of water to lime to make slaked lime and add it to water to make limewater – Students design a reaction pathway chart – Mix up slaked lime with sand to make mortar and observe reaction over two days – Discuss how cement is a mixture of limestone clay and gypsum which has been made into a slurry, heated and dried.	Visit Berrima Cementworks Internet reference: Mining and Uses or Use description in *Chemtext* p486 Library	Report on visit to cement works Report on library research of the history of cement Reaction pathway chart

Communication

Specific content outcomes By the completion of this unit of work students should be able to:	**Teaching ideas and strategies**	**Resources**	**Assessment strategies**
5.11 analyses the impact of human resource use on the biosphere to evaluate methods of conserving, protecting and maintaining Earth's resources. 5.11.1 b) identify properties that make some natural resources economically important and describe their uses 5.11.2a) relate pollution to contamination by unwanted substances	**Environmental Impacts** **Mining** • Students research the reasons for mining of limestone caves (including Guano mining and agricultural lime) and discuss the environmental impacts that could be caused by mining • Students plan a mining project on CD ROM and discuss the rehabilitation of the site	CD: *Resources working for the right balance* (NSW Minerals Council) Visit to a limestone mine and observation of the rehabilitation works/plans for the site Internet reference: Mining and uses Technology	
5.10 ecosystems to: c) describe some impacts of human activities on ecosystems d) discuss strategies used to balance human activities and needs in ecosystems with conserving, protecting and maintaining the quality of the environment	**Tourism** • Students plan a visit to a cave and write a script for a cave guide to give on the tour • Students discuss the issues related to balancing the human activity in the caves with the need to maintain the quality of the cave environment. • Students prepare a brochure for a cave guide to give out explaining the main features of the cave environment	Literacy in science Communication Initiative and enterprise	Script for a cave guide Brochure showing the main features of the cave environment.

2.2 *The Employment Related Skills Logbook*

The Employment Related Skills Logbook is a central element of the NSW Government's *School to Work: Creating Future Pathways*. This logbook has been developed as a means of enhancing students' understanding of the employment related skills they are developing at school and in the community throughout their school years and recording their individual school to work transition planning.

The logbook is a:

- planning tool for students to document employment related skills
- tool for teachers/schools to monitor a student's personal growth and responses to their current learning and future choices
- source of vocational and enterprise learning activities
- source of career/transition references
- tool that encourages students to self-manage their personal career journey
- storage folder for certificates and other important documents
- resource to help students prepare a résumé
- useful tool for schools to use when writing school leaver references.

A CD-ROM is provided in each logbook which contains electronic templates of all pages, allowing teachers and students to print off additional pro-formas and edit pages to suit students' needs.

The *Employment Related Skills Logbook* is a flexible resource for students to collect evidence and document their vocational learning experiences. Each logbook will vary in its collection of content as each individual student has different ideas and aspirations for their future. Ideally, the logbook should be a mix of teacher-directed materials and evidence of student's self-managed transition planning and skills development.

2.2.1 Why use the logbook?

Use of the logbook is consistent with the key directions of the Board of Studies *K-10 Curriculum Framework* and new syllabuses. It is a tool which supports the implementation of the *Work, Employment and Enterprise* cross-curriculum content statement in all new Years 7-10 syllabuses.

The logbook:

- provides teachers with a practical tool for engaging students in self-assessment and peer-assessment, which are features of the new Years 7-10 syllabuses. Such exemplary assessment practices provide opportunities for students to assume responsibility for their own learning which provides a sound basis for personalised learning
- supports teachers in implementing vocational learning across all Stage 5 and 6 key learning areas in line with the *Key Competencies*
- supports the *Quality teaching in NSW public schools* model by enabling classroom teachers to demonstrate to students how their subject develops the skills needed for life after school. It enhances the relevance of all activities students participate in during their school years both inside and outside the classroom
- addresses the demand from employers worldwide for young people to develop generic work skills
- supports contemporary career development practice, which encourages all individuals to develop the capacity to self-manage their careers from a young age.

2.2.2 What's new in the 2005 logbook?

The logbook has been updated to reflect feedback provided by schools. Below is a list of the major changes:

- **Revised employment related skills for Years 9-12**
  The new employment related skills are based on the Employability Skills Framework developed by a project that gathered the views of industry on the critical generic skills required to facilitate employability in Australian workplaces.
- **A description of each skill and how it is demonstrated in the classroom context**
  It is crucial that students have the ability to articulate how they have demonstrated these skills throughout their school and community experiences.
- **New enterprise learning section**
  Activities in this section centre on enterprising attributes and students identifying those attributes within themselves.
- **Revised log sheets**
  The new format allows students to describe the learning experience, identify employment related skills, record examples of how skills were demonstrated and then reflect on the activity or process. The new format assists students to self-manage the process.
- **Improved student instructions and activities**
  Instructions allow students to complete activities independently and self-manage the use of the logbook away from school. Of particular interest are the step-by-step instructions for using the Summary section.
- **Graphics to enhance appeal to students**
  The revised pages are visually appealing for students and show a mix of illustrated pages and plain pages.
- **Introduction section renamed Student section**
  Student section better reflects the focus on providing students with activities relating to self and career exploration to enable them to plan for their futures.
- **CD-ROM supplied with each logbook**
  All templates are provided in Microsoft Word format.
- **New press binder fitting to fasten the Résumé Section.**

2.2.3 *The Employment Related Skills Logbook* overview

The Employment Related Skills Logbook content is designed to encourage students to identify and record their vocational learning experiences. There are eight sections of the logbook which are: Student, Classroom, School & Community, Workplace Learning, Enterprise Learning, Summary, Blank and Résumé. The overview below provides teachers with information regarding the intention of each section and includes suggested strategies for use and guides to facilitation.

Student Section	
Overview	**Who?**
• Contains activities relating to self and career exploration. This section can be used by schools to monitor students' progress with their current learning and its relevance to future choices. • Students can use this section to file research materials and activities regarding their planning processes for their futures. • The Student Section can also be used in careers lessons.	May be facilitated by: • members of the School to Work team • Year adviser • careers adviser.
What's in the Student Section?	**Suggested strategies for using the Student Section**
This Is Me Now activity	An activity for students to reflect on their current life situation and where they would like to be in the future. It is a starting point for students in their school to work planning.
Career research activity using the *myfuture* website	An introduction to the website **www.myfuture.edu.au**. Printed sheets from the *My Guide* section of the website can be stored in the Student Section of the logbook (eg *My Summary*).
Action Plan for students to familiarise them with the process of goal setting	The Action Plan is designed for students to complete at the start of a year, semester, term, week or day. It's a flexible activity that can assist students in their planning processes. There is also an Action Plan in the *My Guide* section of **www.myfuture.edu.au** under *Planning*.
Tracking Sheets for Years 9-12	The Tracking Sheets can be used for school-based tracking, school to work interview processes and student's personal use. The preliminary and HSC Tracking Sheets also monitor subject selection to align with NSW Board of Studies requirements.
Exit Plan for school leavers	The Exit Plan can be worked through with a student who is thinking of leaving or will be leaving school. Designed to be completed and actioned in the last few weeks of school. Students can also file their Student Feedback Report from the *School to Work Program Student Survey* in the Student Section.

2. Employment Related Skills in the Classroom

Classroom Section	
Overview	**Who?**
Introduces the process of logging employment related skills (ERS). The Classroom Section enables teachers to incorporate vocational learning outcomes into their lessons.	• Facilitated by Key Learning Area (KLA) teachers. It is intended that classroom teachers incorporate the process of logging ERS into their teaching programs. • KLA teachers have discretion as to the frequency of logging ERS in their lessons.
What's in the Classroom Section?	**Suggested strategies for using the Classroom Section**
Employment related skills in the classroom for Years 9-12	Definitions for each of the ERS to enhance students' understanding of what they mean. This page can be a reference to assist in completing log sheets.
Activities and examples of employment related skills in the classroom for Years 9-12	Teacher and student examples of how to document ERS demonstrated by students in the classroom. They are preliminary activities and sources for logging ERS.
Sample classroom log sheet	A worked example to assist students in understanding how to log ERS developed in their courses.
Classroom log sheets	Used by students to log the ERS learned in the classroom. Students reflect on the Classroom Activity, Topic, Assignment or Unit then document how three ERS were demonstrated. Students can also reflect on the learning experience.
Computing skills student/teacher assessment	This is a checklist of the skills that students would be expected to display as a result of the ICT cross-curriculum content statement in all new Years 7-10 syllabuses. It assists KLA teachers to determine the extent to which ICT content is addressed in their programs. The resource *ReCaP* provides many student activities on employability skills which align with ERS outlined in the logbook.

School & Community Section	
Overview	**Who?**
• This section gives students the opportunity to record and document their participation in activities outside the classroom and log the employment related skills (ERS) developed in those activities. • It is assumed that students have worked through the Classroom Section and are familiar with the process of logging ERS. The intention is for students to be confident to self-manage logging their ERS for school and community activities.	May be facilitated by: • classroom teacher • careers adviser • Year adviser • School to Work team member.
What's in the School & Community Section?	**Suggested strategies for using the School & Community Section**
Summary of participation and achievements	A checklist for students to list the school and community activities that they have participated in. It may also prompt students to become involved in activities that they may not have thought of.
School & Community log sheet	Same format as the Classroom log sheet. See notes under Classroom log sheet.

Workplace Learning Section	
Overview	**Who?**
• This section gives students the opportunity to focus on the ERS developed through workplace learning experiences. • The intention is for students to work through this section at the time of participation in workplace learning.	May be facilitated by: • careers adviser • VET teacher • School to Work team member.
What's in the Workplace Learning Section?	**Suggested strategies for using the Workplace Learning Section**
Examples of workplace learning	This page is to prompt discussion regarding examples of workplace learning. It includes a list of personal attributes that employers seek in employees as well as providing examples of ERS gained from workplace learning.
Workplace learning research	This activity is designed to assist students to make informed decisions about their workplace learning and focus on what they would like to get out of the experience.
Workplace learning log sheet	Similar to other log sheet pro-formas. This sheet incorporates details of the employer and workplace.

Enterprise Learning Section	
Overview	**Who?**
A new section in the 2005 version of the mainstream logbook. This section highlights the value of authentic learning through enterprise education. It also provides activities and links to many useful resources and programs. This section may also house other worksheets/information/resources relating to enterprise learning. **Note:** Section 5 of the resource *ReCaP* contains a section on enterprise learning and activities that could be used in conjunction with those in the logbook.	May be facilitated by: • KLA teachers • careers advisers • School to Work coordinators • students, who may take the initiative to research enterprise activities and programs themselves and participate.
What's in the Enterprise Learning Section?	**Suggested strategies for using the Enterprise Learning Section**
An enterprising person	A series of attributes that contribute to an enterprising person. This page can be used to discuss the nature of enterprise learning.
Enterprise profile	A research activity for students to understand the attributes and qualities of an enterprising person. The profile prompts students to write about the person's job/role and look at all the varied activities the person is involved in. Students can use the internet or interviews to compile the relevant information.
Student enterprise survey	The survey was designed as an assessment tool through the *Enterprise Education Research Project* (DEST 2004). Students can complete the questionnaire to assess their enterprising attributes so they gain an insight into their strengths and areas for development.
Enterprise survey evaluation	The survey evaluation is an opportunity for students to look at their responses from the survey and reflect on their strengths and areas for development.
Project-based enterprise learning	A project-based enterprise learning activity.
Enterprise activities	Examples of enterprise learning activities sorted by KLA.
More enterprise activities	Enterprise web site resources.
Enterprise learning log sheets	Students use these sheets to log their employment related skills demonstrated through enterprise learning activities.

Summary Section	
Overview	**Who?**
This section allows students to summarise their employment related skills (ERS) by collating skills from all their log sheets.	May be facilitated by: • careers adviser • VET teacher • School to Work team member.
What's in the Summary Section?	**Suggested strategies for using the Summary Section**
Summary of employment related skills	These pages are for students to collate their ERS from all completed log sheets. This process will enable students to create a dossier of ERS to be used in the preparation of résumés, applications for jobs or for further education.
Blank Section	
Overview	**Who?**
The Blank Section is an area for students to file additional activities related to their transition planning. These may include: • specific vocational learning classroom activities • logbook assignments and or homework • work for *The Real Game* series • **www.myfuture.edu.au** research or • any careers related research. The statement page after the cardboard tab is meant to be taken out once the space is used. Students can write the title of this section on the cardboard tab.	This section may be student or teacher managed.

myfuture
Australia's career information service
myfuture.edu.au

the Real game series™

Résumé Section	
Overview	**Who?**
The Résumé section helps students write a résumé and compile their portfolio.	May be facilitated by: • KLA teacher • careers adviser • Year adviser.
What's in the Résumé Section?	**Suggested strategies for using the Résumé Section**
Tips for setting out a résumé/portfolio	This page outlines a few tips for students as a starting point for discussion on how to plan or write a résumé. For further information students can log on to **www.myfuture.com.au**.
Résumé cue cards	These are designed to be cut up into squares and are "reminders" for where documents are to be filed in the future. These pages are a guide to help students write their résumé. Students should be encouraged to look at different types and formats of résumés to create an individual document.

2.2.4 Models of logbook implementation in schools

There is no single or preferred model for implementation of the *Employment Related Skills Logbook* as each school responds to the diverse needs of their students.

Ultimately, the goal is for students to be competent self-managers of their career path and planning and this would include, as a key element, effectively using and managing the logbook. The guidance and support of teachers in this process is critical to individual student success.

The models below indicate how the logbook is currently being managed by schools.

MODEL 1	The classroom unit is taught to students through a variety of learning and assessment strategies. Logging of employment related skills is completed at the end of the unit and the log sheet is filed into the logbook.
MODEL 2	Logging of employment related skills is completed once a week throughout the unit of work. Various activities and/or assignments are logged and log sheets are filed in the logbook.
MODEL 3	Unit of work is taught to students. Careers adviser manages the logging of employment related skills of selected lessons/subjects in careers lessons.
MODEL 4	The school timetables a *School To Work* week, once a term. Employment related skills are logged in each lesson for the duration of that week.

2.2.5 Teacher examples: Logging employment related skills in the classroom

Science Stage 5

The following example shows some of the employment related skills developed by students as a result of their participation in activities or topics addressing Science Stage 5 outcomes. Using the example as a guide, develop your own list of employment related skills that students may gain by undertaking activities or curriculum topics in your classroom.

Classroom Activity, Topic, Assignment or Unit				
Electrical Energy				
Employment Related Skills ☑				
☐ Self-management	☐ Initiative and enterprise	☐ Learning	☑ Communication	☐ Cross-cultural understanding
☐ Teamwork	☑ Planning and organising	☑ Problem solving	☑ Technology	
Describe how three of these skills were demonstrated *Students can … /Students are able to … /Students know how to …*				
Skill: *Planning and organising*	• *develop a design and construct electrical circuits – for example, parallel and series circuits* • *select appropriate equipment andlor use resources to model household circuits*			
Skill: *Communication*	• *research energy usage of household appliances and present findings in a written report* • *draw electrical circuits using the correct symbols*			
Skill: *Technology*	• *construct a database on energy usage*			
Reflection on Learning Experience ☑ *Comment on one or more of the following:*				
☑ areas of success	☐ areas for improvement	☑ further research		
• *Students enjoyed developing the database and would like to work more with computers.* • *On completion of this unit students may also explore an electrical apprenticeship.*				

Science Stage 5

The following example shows some of the employment related skills developed by students as a result of their participation in activities or topics addressing Science Stage 5 outcomes. Using the example as a guide, develop your own list of employment related skills that students may gain by undertaking activities or curriculum topics in your classroom.

Classroom Activity, Topic, Assignment or Unit

Beginning to End (Watson-Crick model of DNA)

Employment Related Skills ☑

☐ Self-management	☑ Initiative and enterprise	☐ Learning	☑ Communication	☐ Cross-cultural understanding
☐ Teamwork	☐ Planning and organising	☐ Problem solving	☑ Technology	

Describe how three of these skills were demonstrated

Students can … /Students are able to … /Students know how to …

Skill: *Initiative and enterprise*

- *research and develop a model that represents the Watson-Crick DNA concept*
- *explore the link between DNA fingerprinting and TV shows such as CSI: Crime Scene Investigation*

Skill: *Technology*

- *use computer simulations – for example, CD-ROM and Internet to learn the concepts of cell division, DNA and genes*
- *use the Internet to research a genetic disease*
- *create a presentation on information gained through research*

Skill: *Communication*

- *present an oral report on genetic diseases*

Reflection on Learning Experience ☑

Comment on one or more of the following:

☐ areas of success	☐ areas for improvement	☑ further research

- *Students may explore career options in the area of science, especially genetics.*

2. Employment Related Skills in the Classroom

Biology Stage 6

The following example shows some of the employment related skills developed by students as a result of their participation in activities or topics addressing Biology Stage 6 outcomes. Using the example as a guide, develop your own list of employment related skills that students may gain by undertaking activities or curriculum topics in your classroom.

Classroom Activity, Topic, Assignment or Unit				
Patterns in Nature (Preliminary)				
Employment Related Skills ☑				
☐ Self-management	☐ Initiative and enterprise	☐ Learning	☑ Communication	☐ Cross-cultural understanding
☑ Teamwork	☑ Planning and organising	☐ Problem solving	☐ Technology	
Describe how three of these skills were demonstrated *Students can … /Students are able to … /Students know how to …*				
Skill: *Planning and organising*	• *plan, trial and design an investigation to identify substances in tissues*			
Skill: *Communication*	• *gather, process, analyse and present information that compares the digestive system of a variety of mammals*			
Skill: *Teamwork*	• *work in a team to present microscope slide diagrams that represent the mitosis sequence*			
Reflection on Learning Experience ☑ *Comment on one or more of the following:*				
☐ areas of success	☑ areas for improvement	☐ further research		
• *Students require more experience in planning and designing experiments.*				

2. Employment Related Skills in the Classroom

Chemistry Stage 6

The following example shows some of the employment related skills developed by students as a result of their participation in activities or topics addressing Chemistry Stage 6 outcomes. Using the example as a guide, develop your own list of employment related skills that students may gain by undertaking activities or curriculum topics in your classroom.

Classroom Activity, Topic, Assignment or Unit				
The Chemical Earth				
Employment Related Skills ☑				
☐ Self-management	☐ Initiative and enterprise	☐ Learning	☑ Communication	☐ Cross-cultural understanding
☐ Teamwork	☑ Planning and organising	☑ Problem solving	☐ Technology	

Describe how three of these skills were demonstrated

Students can … /Students are able to … /Students know how to …

Skill: *Planning and organising*

- *analyse information and plan an investigation to identify a range of metals*

Skill: *Communication*

- *use graphs to present information on chemical percentage in soil samples*
- *use appropriate terminology to discuss chemical reactions on earth*

Skill: *Problem solving*

- *identify and use safe work practices during investigations*

Reflection on Learning Experience ☑

Comment on one or more of the following:

☐ areas of success	☐ areas for improvement	☑ further research

- *Some students developed a keen interest in doing follow-up research on occupations such as Science Field Officers and Geoscientists.*

2. Employment Related Skills in the Classroom

Earth and Environmental Science Stage 6

The following example shows some of the employment related skills developed by students as a result of their participation in activities or topics addressing Earth and Environmental Science Stage 6 outcomes. Using the example as a guide, develop your own list of employment related skills that students may gain by undertaking activities or curriculum topics in your classroom.

Classroom Activity, Topic, Assignment or Unit				
Environments Through Time				
Employment Related Skills ☑				
☑ Self-management	☐ Initiative and enterprise	☑ Learning	☐ Communication	☐ Cross-cultural understanding
☐ Teamwork	☑ Planning and organising	☐ Problem solving	☐ Technology	
Describe how three of these skills were demonstrated *Students can … /Students are able to … /Students know how to …*				
Skill: *Self-management*	• *plan, organise and complete an independent research task using secondary information on climate change*			
Skill: *Learning*	• *prepare a timeline displaying an understanding of geological time*			
Skill: *Planning and organising*	• *summarise and collate information from a range of resources to be represented in a table*			
Reflection on Learning Experience ☑ *Comment on one or more of the following:*				
☐ areas of success	☐ areas for improvement	☑ further research		
• *Students showed interest in investigating a range of career options related to Environmental Science.*				

2. Employment Related Skills in the Classroom

Physics Stage 6

The following example shows some of the employment related skills developed by students as a result of their participation in activities or topics addressing Physics Stage 6 outcomes. Using the example as a guide, develop your own list of employment related skills that students may gain by undertaking activities or curriculum topics in your classroom.

Classroom Activity, Topic, Assignment or Unit				
Electrical Energy in the Home				
Employment Related Skills ☑				
☐ Self-management	☐ Initiative and enterprise	☐ Learning	☑ Communication	☐ Cross-cultural understanding
☐ Teamwork	☑ Planning and organising	☑ Problem solving	☐ Technology	
Describe how three of these skills were demonstrated *Students can … /Students are able to … /Students know how to …*				
Skill: *Communication*	• *present an oral report on energy usage of electrical kitchen appliances*			
Skill: *Planning and organisation*	• *create a model of electrical circuits representing circuits in the home* • *plan and perform an investigation on the effect of resistors in an electrical circuit*			
Skill: *Problem solving*	• *use mathematical formula to solve problems related to electrical usage*			
Reflection on Learning Experience ☑ *Comment on one or more of the following:*				
☑ areas of success	☐ areas for improvement	☐ further research		
• *Students became more informed about electrical useage in the home and aware of the OH&S related to this.*				

2. Employment Related Skills in the Classroom

Senior Science Stage 6

The following example shows some of the employment related skills developed by students as a result of their participation in activities or topics addressing Senior Science Stage 6 outcomes. Using the example as a guide, develop your own list of employment related skills that students may gain by undertaking activities or curriculum topics in your classroom.

Classroom Activity, Topic, Assignment or Unit				
Water for Living				
Employment Related Skills ☑				
☐ Self-management	☐ Initiative and enterprise	☑ Learning	☑ Communication	☐ Cross-cultural understanding
☑ Teamwork	☑ Planning and organising	☐ Problem solving	☐ Technology	
Describe how three of these skills were demonstrated *Students can … /Students are able to … /Students know how to …*				
Skill: *Planning and organising*	• *design and conduct an investigation that allows valid and reliable data to be collected*			
Skill: *Teamwork*	• *negotiate roles and responsibilities to measure, observe and record results of an investigation*			
Skill: *Learning*	• *analyse information to develop generalisations and provide a justification for the generalisations*			
Reflection on Learning Experience ☑ *Comment on one or more of the following:*				
☐ areas of success	☑ areas for improvement	☐ further research		
• *Students require more practice in designing and carrying out investigations in the field.*				

2.2.6 Teacher activity: Logging employment related skills in the classroom

Using the examples provided in this section:

1. Identify an activity, topic, assignment or unit of work you teach to your students
2. Of the nine employment related skills, tick the ones that you feel students have demonstrated in this activity/topic/assignment/unit
3. Choose three of these skills and describe how each skill has been demonstrated (refer to *5.1 Employment related skills and their elements*)
4. Reflect on students' learning and identify an area of success, of further improvement or further research that you feel students can document.

This is the process that students undertake in documenting their employment related skills in their *Employment Related Skills Logbook.*

Classroom Activity, Topic, Assignment or Unit				
Employment Related Skills ☑				
☐ Self-management	☐ Initiative and enterprise	☐ Learning	☐ Communication	☐ Cross-cultural understanding
☐ Teamwork	☐ Planning and organising	☐ Problem solving	☐ Technology	
Describe how three of these skills were demonstrated *Students can … /Students are able to … /Students know how to …*				
Skill: _____				
Skill: _____				
Skill: _____				
Reflection on Learning Experience ☑ *Comment on one or more of the following:*				
☐ areas of success	☐ areas for improvement	☐ further research		

3. Student Vocational Learning Activities

"Vocational learning is general learning that has a vocational perspective. It includes elements such as general employability skills, enterprise education, career education and community and work-based learning. All students should experience vocational learning at each year level throughout their schooling."

MCEETYA framework for vocational education and training in schools – policy directions (2001)

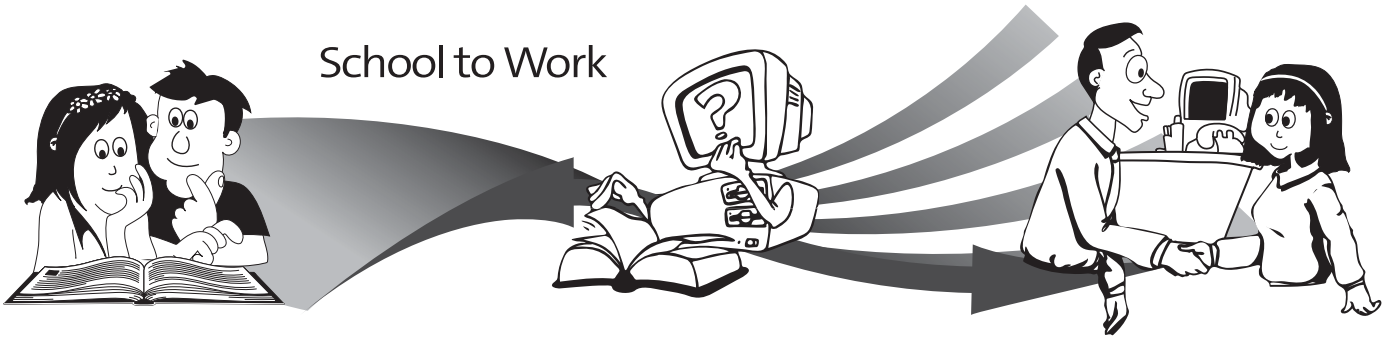
3.1 Science student activities

Vocational learning is every teacher's business and it should be integrated into everyday teaching and learning. Effective teaching and learning is enhanced by providing access to environments within and beyond the classroom which link student learning to personal, social and work contexts. Students need to have an understanding of the work environment, career options and career pathways, life-long learning and how their employment related skills support both career and life pursuits.

The following pages provide student activities and a teaching unit to support you in incorporating vocational learning in your curriculum. This material has been developed by your colleagues as a starting point for you to create and develop other curriculum activities that support vocational and enterprise learning for your students.

For additional vocational learning activities, please refer to the 2003 edition of *Vocational Learning in Science.*

3.1.1 Education and Training Pathways



COMPULSORY EDUCATION YEAR 10

HSC

General and Vocational courses
Vocational Education and Training courses include: TAFE VET and SCHOOL VET and School based part-time traineeships.

credit transfer

TAFE

Year 10 TAFE entry

UAI not as anticipated

UAI

UAI not as anticipated

No UAI

credit transfer

UAI as anticipated

credit transfer

University linked Course or College

Bridging course alternative entry course/program/ college with direct credit links

Private College

Certificate or Diploma

TAFE

Year 12 TAFE entry

Certificate or Diploma

Work plus on-the-job training

EG: Traineeship Apprenticeship or Cadetship

Certificate Diploma or Degree

credit transfer

credit transfer

University

credit transfer

University (Full fee paying)

credit transfer

University Degree

credit transfer

JOB

TRADE

ENTERPRISE

WORK

OFFICE

CAREER

PROFESSION

3.1.2 Education and Training Pathways

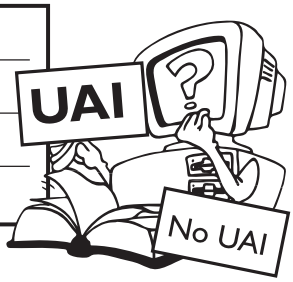
FOR A CAREER RELATING TO ***Science***

Student Activity:

1. Go to the bottom of the page. Write in the name of an interesting job or career that relates to the field of Science.
2. Write your school subjects in the boxes provided.
3. Refer to the Education and Training Pathways sheet and do some research on courses that may lead to your chosen career.
4. Draw arrows from the subject boxes to map two pathways that lead to this career.
5. Fill in the shaded boxes with the information you find.

MY SCHOOL CERTIFICATE SUBJECTS

MY HSC COURSES



TAFE
Year 10 entry certificate
Course Name:
Campus:

Private College
Course Name:
College:

University linked Course or College
Course Name:
University linked to:

TAFE
Year 12 or equivalent entry
Course Name:
Campus:

Work
plus on-the-job training
Industry:
Training Program:

University
Course Name:
University:
Approximate UAI range:
Prerequisites:

A job or career that sounds interesting to me:

As you can see, there is more than one way to get into any career

3.1.3 Science reporter for a day

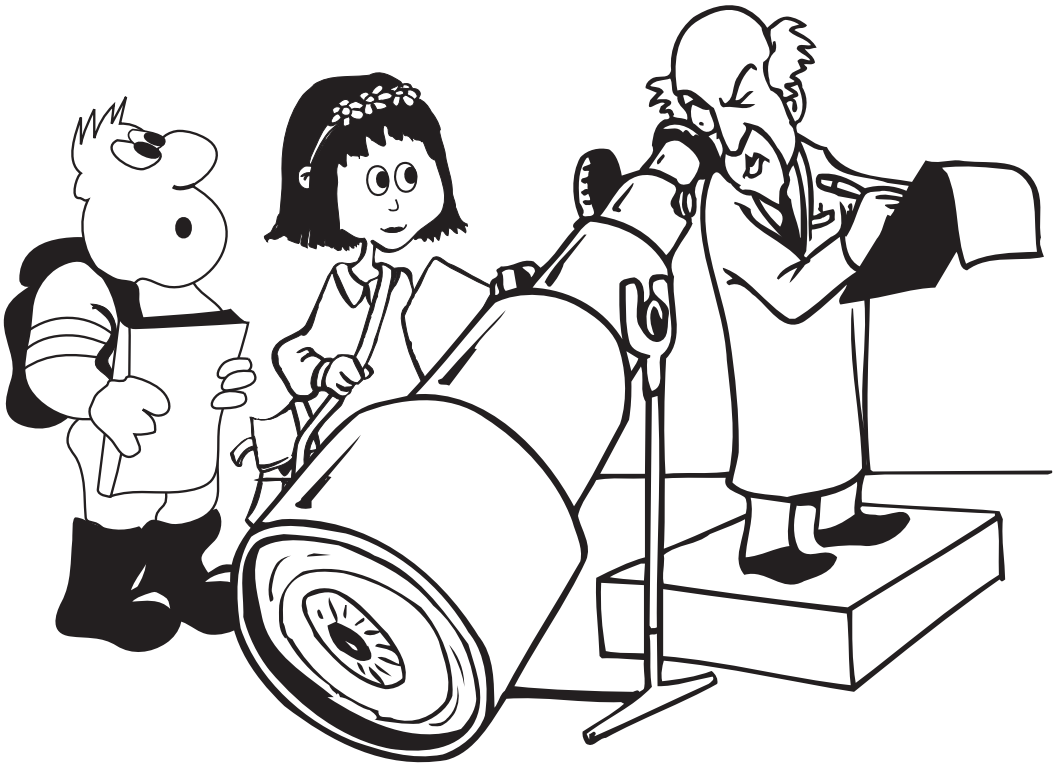
You have just won the competition to be Science reporter for a day. This will involve you interviewing some young scientists for Network Ten's famous national TV program, Totally Wild

You are to:

- Read the profiles of the four scientists featured on the website **http://www.publish.csiro.au/sciencereporter/home/scientists.cfm**
- Watch the videos for each of these four scientists.
- Write a script that you would use when interviewing these scientists on national television. Your script should include questions relating to:
  - The skills that each scientist uses in their current position
  - The types of activities the scientists are involved in
  - Why each scientist chose a career in the sciences
  - What career path did each scientist take
  - What interests them about science
- Your script must include questions that are designed to get as much information as possible from the person interviewed. Think about possible answers to each of your questions and then develop further questions that could be asked of the scientists.

Other profiles of scientists are available at:

http://www.csiro.au/helix/sciencecareers/profiles.htm



3.2 Science teaching unit: Staying Healthy

Australian Government
Quality Teacher Programme

Note: This unit of work has been adapted from the unit of work produced by Kristina Temple at Airds High School, as part of the *Australian Government Quality Teacher Programme Vocational Learning Project* in 2003.

Unit Title: Staying Healthy	**Stage 5 (Year 9)**	**Suggested Unit Length:** 6-8 weeks
Unit Context: Through role-play, scientific investigations and internet research activities, students link their perceptions of illness either to personal experience or to television programs and movies. They look at the causes and control of diseases and the technology that is used to diagnose and cure diseases. They learn the structure and function of the nervous system and the endocrine system through model making and research.		
Target Outcomes: PFA 5.4, 5.5 Knowledge and Understanding 5.8, 5.12 Skills 5.14, 5.15, 5.16, 5.18, 5.20, 5.22 Values and attitudes 5.26	**Resources:** *Core Science 3* *Literacy in Science Book 4* by Wendy St Germain Video – *Radioisotopes at Work* (Classroom Video – Warriewood NSW) Worksheets Disease cards Prepared microscopic slides of human parasites	
Unit Overview: *This unit looks at the causes and control of diseases and the technology that may be used to diagnose and cure diseases. It covers the structure and function of the nervous system and the endocrine system. The unit integrates employment related skills into the lessons so that students can identify and document their learning.*		

3. Student Vocational Learning Activities

Syllabus outcomes	Syllabus content	Integrated learning experiences, instruction and assessment	Employment related skills	Evidence of learning
5.8 A student relates the structure and function of living things to models, theories and laws	5.8.4 Students learn about humans to: (b) describe some responses of the body's systems to infectious and non-infectious diseases	The teacher introduces the students to the topic by showing an extract from a television hospital series.		
		The students brainstorm the focus question: Why do you think TV programs about hospitals and people getting sick are so popular?	Self-management	Students produce a mind map of their brainstorming.
		Students write a short story about how they felt when they, or a close friend or relative, were very sick. Students share their stories with the class.	Communication	Students describe the experience of others.
		Students are provided with topic overview. ***Worksheet 1***.		Blank spaces on the overview are filled in as learning takes place.
		Students work in pairs to categorise some common diseases into two groups – infectious and non-infectious ***(Disease Cards Set 1)***. Students work in groups with disease cards to brainstorm the causes of disease ***(Disease Cards Set 2)***.	Teamwork Communication	Students identify diseases as infectious or non-infectious and explain the difference. Students identify the causes of selected diseases.
		Students research a disease (chosen from ***Disease Cards Set 1***) on the Internet using a Search Engine and write a short report using the guidelines set out on ***Worksheet 2***.	Technology Communication	Students produce a report using Microsoft Word that follows the guidelines.
		Students brainstorm in groups how our bodies fight disease, and produce a mind map.	Problem solving	Students produce a mind map that identifies ways in which the body fights disease.
		Cancer – The Statistics Students access a designated web site (**www.aihw.gov.au**) to retrieve and interpret information about the incidence of cancer in Australia and create an Excel spreadsheet from some specific data. ***Worksheet 3***.	Technology	Students access the website, analyse the incidence of cancer in the Australian population and produce an Excel spreadsheet and graph on Australian cancer statistics.

Syllabus outcomes	Syllabus content	Integrated learning experiences, instruction and assessment	Employment related skills	Evidence of learning
		Genetic Diseases Students contact a specific genetic disease organisation by creating a business letter in order to request information about the disease. The information received from the organisation will be presented to the class as a five minute speech. ***Worksheet 4***.	Technology Communication	Students present a five minute speech on a genetic disease they have research via a recognised organisation.
		Prevention or Cure Students complete the worksheet on Pharmaceuticals and Drug Trials from *Literacy in Science Book 4* by Wendy St Germain. Students brainstorm in groups the body systems already studied and identify unfamiliar ones. ***(Worksheet 6 – see page 41).***	Teamwork Communication	Students identify the role of drugs in preventing and treating disease. Students identify all the systems that make up the human body including the endocrine and nervous systems.
	(a) Describe the role of, and interaction between, coordination systems in maintaining humans as functioning organisms.	Students research the nervous system on the Internet and identify key components.	Technology Planning and organising Communication	Students produce a Microsoft Word document identifying the key features of the nervous system and a diagram of the nervous system. Students produce a model of a neuron identifying key features.
		Students make a model of a neuron using either pipe-cleaners, modelling clay or string.	Initiative and enterprise	
		Students working in groups of four create a role-play to explain how messages are sent from one neuron to another.	Teamwork Communication Planning and organising	Students devise a role-play to identify how signals are transferred from one neuron to another.
		Internet Research – Students locate the organisation *Beyond Blue* and retrieve specific information from the website.	Technology	Students locate the specified site and obtain the requested information.

3. Student Vocational Learning Activities

Syllabus outcomes	Syllabus content	Integrated learning experiences, instruction and assessment	Employment related skills	Evidence of learning
		Students in pairs research one nervous system disease and write a report on it. The information will then be placed on an A3 poster with the intention of community awareness of the disease.	Teamwork Communication Planning and organising Initiative and enterprise	Students identify a disease of the nervous system and produce a poster to raise community awareness of the disease.
		Students recall an instant when they were frightened suddenly and share it with the class, attempting to explain what happened in their body.	Communication	Students recall the body's response to shock and identify some key words that may be used in describing it, such as 'adrenalin'.
		Students use a scientific dictionary to find the meaning of words pertaining to the endocrine system, example endocrine, exocrine, gland, hormone, homeostasis and dehydration.	Communication	Students produce a class glossary of words associated with the endocrine system.
5.4 A student discusses evidence supporting different viewpoints	5.4 Students learn about the implications of science for society and the environment Students learn to: discuss viewpoints about some issues with major scientific component. Give examples to show that different societal groups may use or weight criteria differently to make a decision about an issue involving a major scientific component.	Biotechnology Ethics – The students read a real-life case study of a young organ transplant recipient and discuss the associated questions. *Biology the Common Threads – Student Workbook Part 2* – Australian Academy of Science 1991	Communication	Students describe the problems associated with organ transplants.

Syllabus outcomes	Syllabus content	Integrated learning experiences, instruction and assessment	Employment related skills	Evidence of learning
	(a) Identify choices that need to be or have been made when considering whether to use particular scientific advances.	The students work in groups for 20 minutes to discuss and present their opinions about one of three transplant issues on ***Worksheet 5***.	Teamwork Communication	Students assess a moral issue and provide an opinion about a solution to the problem.
	(b) Discuss the place of social and ethical considerations in scientific practice and in applications of science.	**Prevention or Cure research activity.** Students research, using a search engine, the use of thalidomide in the 1960s as a nausea suppressant for pregnant women. ***Worksheet 6***. See previous learning experience 5.4 (a)	Technology Planning and organising Self-management	Students outline the extent of thalidomide use and explain the effects.
5.5 A student analyses how current research might affect people's lives.	5.5 Students learn about current issues, research and developments in science.	**Biotechnology** – students use a search engine to research an example of biotechnology and create a word document with pictures. ***Worksheet 7***.	Technology Initiative and enterprise	Students identify an example of biotechnology and explain its use.
	Students learn to: (a) evaluate the potential impact of some issues raised in the mass media that require some scientific understanding (b) identify scientific skills that can be useful in a broad range of careers.	**Outbreak at School** ***(Worksheet 8 – see page 43).***	Problem solving	Students evaluate a hypothetical situation and use existing knowledge of the topic to devise a plan of action.
	(c) identify possible career paths in science.	**Staying Healthy Careers** Students work in groups of three. Students complete a table by writing down all the careers they can think of that would relate to the topic *Staying Healthy* and give a brief explanation of what they believe the roles of these people would be. ***Worksheet 9***.	Teamwork Planning and organising	Students identify career paths in the fields of health and medicine and explain their roles.

3. Student Vocational Learning Activities

Syllabus outcomes	Syllabus content	Integrated learning experiences, instruction and assessment	Employment related skills	Evidence of learning
5.12 A student relates the interactions involved in using some common technologies to their underlying scientific principles.	5.12 Students learn about technology Students learn to: (a) discuss the benefits and problems associated with medical and industrial uses of nuclear energy.	**Radioisotopes** – Students follow instructions to complete the Marking the Text activity on Radioisotopes. ***Worksheet 10***.	Communication	Students identify key points in the text.
		Students view the video *Radioisotopes at Work* and then write a short report weighing up the advantages and disadvantages of producing radioactive substances.	Communication	Students outline the benefits and dangers of radioactive substances.
	(b) describe some benefits and problems of using biotechnology	*Biotechnology Ethics* Stem Cell Research. Students will view a video on Stem Cell Research and then organise a class debate – "Human embryos should be used for stem cell technology"	Communication Planning and organising	Students present evidence for using or not using human embryos for stem cell technology.
5.14 A student undertakes first-hand investigations independently with safety and competence	5.14 Students learn about performing first hand investigations. Students learn to: (a) follow the planned procedure when performing an investigation (b) use time and resources effectively (c) demonstrate the use of safe and hygienic work practices including the correct use of safety equipment.	Students perform a first hand investigation using microscopes to view parasites on prepared slides. Students draw their observations paying particular attention to the methods used by the parasites to attach to their host.	Learning	Students produce a laboratory report which outlines the methods parasites use to attach to their hosts.
		Students perform a first hand investigation on **Natural Antibiotics**. This investigation has students testing the antibiotic properties of Dettol™, garlic and tea tree oil on bacteria. Adapted from the Biotechnology Australia website.	Communication Planning and organising Self-management	Students produce a laboratory report comparing the effectiveness of natural antibiotics.
5.15 A student gathers first-hand data accurately.		Students perform a first hand investigation, Microbes are Everywhere. Students are provided with agar plates to observe the presence and distribution of bacteria in the air and on their hands and breath. This involves incubating the bacteria for a couple of days. Students collate results and look at patterns in the data.	Problem solving Planning and organising Communication	Students produce a laboratory report that includes a table of class results and a conclusion.

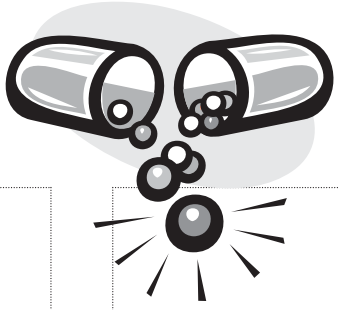
Syllabus outcomes	Syllabus content	Integrated learning experiences, instruction and assessment	Employment related skills	Evidence of learning
5.16 A student accesses information from a wide variety of secondary sources.		Research/Internet activity – Students work in pairs to label a diagram of the endocrine system and create a table naming the glands, the hormones they produce and their function.	Technology Teamwork	Students produce a labelled diagram of the endocrine system and a table listing glands, hormones and their function.
5.18 A student selects and uses appropriate forms of communication to present information to an audience.	5.18 Students learn about presenting information (b) Students learn to select and use appropriate medium to present data and information.	Students complete an Assessment Task on **Staying Healthy**. Suggestions include students preparing a website, poster or pamphlet warning the public about the dangers of a particular infectious disease. It may also include a famous Australian scientist match-up activity and an activity that requires students to identify whether some specified diseases are infectious/non-infectious and their cause.	Initiative and enterprise Technology Communication Planning and organising	Students produce a web page, poster or pamphlet. Students identify a famous Australian scientist and describe their contributions to the field of medicine. Students identify some common diseases as infectious or non-infectious and explain the cause of the disease.
5.20 A student selects and uses appropriate strategies to solve problems.	5.20 Students learn about problem solving. Students learn to: (a) describe different strategies that could be employed to solve an identified problem	Students working in groups perform the problem solving activity **Outbreak At School** where they devise a plan to isolate a disease outbreak at school and locate its source. Internet sites where students can solve an outbreak mystery can be found at: **www.accessexcellence.org/AE/mspot/twoforks** or **www.accessexcellence.org/tbs/**	Communication Problem solving Planning and organising Teamwork Technology Learning Self-management	Students produce a group report outlining how a disease outbreak could be contained in a school environment and how a source of the disease could be identified.

3. Student Vocational Learning Activities

Syllabus outcomes	Syllabus content	Integrated learning experiences, instruction and assessment	Employment related skills	Evidence of learning
5.22 A student plans, implements and evaluates the effectiveness of a variety of tasks.	5.22.2 Students learn about working in teams Students learn to: (a) independently plan and conduct investigations, communicate information and understanding and solve problems (b) negotiate and allocate individual roles to members of a team	Various activities throughout the unit such as **Outbreak at School** and **Biotechnolgy Ethics**.		
5.25 A student recognises the relevance and importance of lifelong learning and acknowledges the continued impact of science in many aspects of everyday life.		Students, working in groups, research on the Internet a recipe for making yoghurt, cheese, ginger beer or bread. Then they perform a first hand investigation using their results to recognise the relevance of biotechnology to their everyday lives.	Technology Teamwork Planning and organising Learning	Students produce any one of the foodstuffs mentioned and write up a laboratory report.

Disease Cards Set 1

Infectious



Angiostrongyliasis	Anthrax
Botulism	Cholera
Cysticercosis	Diphtheria
Glandular Fever	Hansen's Disease
Legionnaires' Disease	Listeriosis
Mad Cow Disease	Meningitis
Otitis Media	Pediculosis
Pneumonia	Psittacosis
SARS	Scarlet Fever
Toxoplasmosis	Typhoid

Disease Cards Set 1

Non-infectious

Adrenoleukodystrophy

Bipolar Disorder

Cystic Fibrosis

Gingivitis

Huntington Disease

Marfan Syndrome

Narcolepsy

Phenylketonuria

Sickle Cell Disease

Tay-Sachs Disease

Tendinitis

Beta-thalassemia

Chronic Fatigue Syndrome

Fragile X Syndrome

Haemophilia

Lupus

Multiple Sclerosis

Neurofibromatosis

Psoriasis

Sleep Apnoea

Tourette Syndrome

Disease Cards Set 2

AIDS	Viral disease spread by contact with human body fluids.
Anorexia Nervosa	Mental disorder where sufferer believes they are severely overweight.
Arthritis	Arthritis is an inflammatory disease that causes pain, swelling, stiffness, and loss of function in the joints. Rheumatoid arthritis is one of several autoimmune diseases, so-called because a person's immune system attacks his or her own body tissues. Scientists still do not know exactly what causes this to happen.
Asbestosis	A disease of the lungs caused by exposure to asbestos.
Athletes Foot	A fungal disease of the feet that causes redness, itching and cracked skin. Also known as tinea. Breeds in wet areas such as bathrooms where the spores can come in contact with human skin.
Common Cold	A mild viral infection involving the nose and respiratory passages but not the lungs. It is passed on by sneezing, coughing and inhaling the respiratory secretions.
Depression	A mental disorder characterised by an inability to concentrate, insomnia, feelings of extreme sadness, guilt, helplessness and hopelessness, and thoughts of death.
Diabetes	Disease of the pancreas caused by lack of insulin or problems detecting insulin characterised by excessive urination and high or low blood sugar levels.
Haemophilia	Inherited disease that stops the blood from clotting.
Heart Disease	Narrowing of the coronary arteries because of high cholesterol levels as a result of poor diet and lack of exercise.

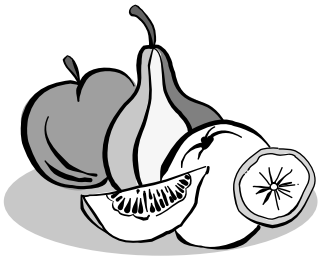
Disease Cards Set 2

Hepatitis B	The most common viral liver infection transmitted through blood and infected bodily fluids. Most people do not have noticeable symptoms when they are infected.
Impetigo	A golden staph infection commonly called “school sores”. Children can spread it from one area of the body to another when they touch themselves with fingers that have been in contact with scratched, infected skin.
Influenza	A severe viral infection involving the respiratory tract. It is marked by inflammation of the nasal mucosa, the pharynx, and conjunctiva, and by headaches.
Leukaemia	Cancer of the white blood cells. The cause can be unknown.
Malnutrition	Lack of essential nutrients for sound health and growth. Bad nutrition may result from poor diet or lack of appetite. Symptoms include decayed teeth, dizziness and poor growth.
Measles	Viral disease spread by direct contact with nasal or throat secretions or airborne fluids. Shows as red spots on the skin and produces a fever.
Meningococcal	Disease caused by bacteria which infects the blood and the covering of the brain and spinal cord.
Mumps	Mumps is a disease caused by a virus that usually spreads through saliva and can infect many parts of the body, especially the parotid salivary glands. The sign of mumps is swelling and pain in the glands, making a child look like a hamster with food in its cheeks.
Obesity	A disease caused by overeating. Characterised by overweight body and shortness of breath when exercising.

Osteoporosis	Loss of bone strength, bone fractures and stooped posture. Afflicts the elderly and is caused by calcium and phosphorous being taken from the bones and used for the function of organs.
Plantar Warts	Warts are one of several soft tissue conditions of the foot that can be quite painful. They are caused by a virus, which generally invades the skin through small or invisible cuts and abrasions. They can appear anywhere on the skin, but, technically, only those on the sole of the foot are properly called plantar warts.
Poliomyelitis	A severe viral disease marked by inflammation of nerve cells of the brain stem and spinal cord. It is spread through contact with faeces.
Ringworm	A fungal disease that produces red rings on the body.
Ross River Fever	This debilitating disease is spread by mosquitoes with a range that includes coastal Northern and Eastern Australia and Papua New Guinea.
Tapeworm	A parasitic disease caused by a worm that lives in the small intestine.
Tetanus	A life-threatening disease caused by toxins produced by bacteria which often grow at the site of a cut or wound. Muscles first become stiff, then rigidly fixed.
Tonsillitis	Contagious viral infection that is an inflammation of the tonsils and is spread by droplet transmission.
Whooping Cough	Contagious disease caused by bacteria that is carried in the lungs, throat and nose. Attacks of a choking cough that last from 1 to 2 minutes, often with vomiting, severe facial congestions and a feeling or appearance of suffocation.

Worksheet 1

STAYING HEALTHY OVERVIEW



NORMAL CELLS

HEALTHY TISSUES & ORGANS

BODY SYSTEMS

NERVOUS SYSTEM

ENDOCRINE SYSTEM

ABNORMAL CELLS

DISEASES

1.

2.

MENTAL DISEASE
eg

CAUSES

1.
2.
3.
4.

GENETIC
eg

BIOTECHNOLOGY
Stem cell research

DEFENCES AGAINST DISEASE

LIFESTYLE CHOICES
eg smoking, alcohol, drugs, UV radiation

DIET & EXERCISE

LIVER CIRRHOSIS

PREVENTION OR CURE
1.
2.

CANCER
Leukaemia
Skin
Lung

HEART DISEASE

BIOTECHNOLOGY
Pacemaker
Coronary Stint
Coronary Pacemaker

DETECTION & TREATMENT
Radioisotopes

TRANSPLANTS

BIOTECHNOLOGY
Bionic ear

Worksheet 2

DISEASE

Internet Activity: Disease cards set 1. Every student picks a disease from a box to research on the Internet using a search engine.

Questions to be answered from your research

1. What is the name of your disease?
2. Does this disease have a common name and if so what is it?
3. What causes this disease?
4. Can you catch this disease from someone else?
5. How would you know if you had it, or what are the symptoms of this disease?
6. Can it be treated and how would this be done?

Name of Disease:

Employment Related Skills: Identify the employment related skills in the work and activities you performed in this section and complete a Classroom log sheet from your logbook.

Worksheet 3

CANCER – THE STATISTICS

Cancer is the third leading underlying cause of death in Australia. Most types of cancer that have a high incidence in Australia are related to lifestyle choices such as diet, sun baking and tobacco smoking.

Internet activity: It is your task to collect some data on the incidence of cancer in Australia. To do this you will have to go to the web site of The Australian Institute of Health and Welfare (**www.aihw.gov.au**). You are looking for interactive cancer data that is age-specific.

Questions

1. In the year 2000 what type of cancer had the highest incidence in males aged between 15 and 19?

2. In 1990 what type of cancer had the highest incidence in females?

3. Has the incidence rate of this cancer increased or decreased since then?

4. In 1990 what type of cancer had the highest incidence in males?

5. What has happened to the incidence rate of this cancer since then?

Data collection – From this site you will need to collect some data and using an Excel spreadsheet present it in graphical form.

In the year 2000 there were 12 types of cancer that were found in the 5 to 9 year old age group. Produce an Excel spreadsheet and graph to show the types of cancer and the numbers of 5 to 9 year olds affected.

Employment Related Skills: Identify the employment related skills in the work and activities you performed in this section and complete a Classroom log sheet from your logbook.

Worksheet 4

GENETIC DISEASES

It is possible that our hair and eye colour and height are not the only things we have inherited from our ancestors. We may carry family genes that put us at increased risks for passing on or developing certain genetic diseases and cancers. Being knowledgeable about the causes and care of inherited diseases can help us to calm our fears and make better choices about our futures.

Genetic diseases are medical conditions caused by mutations in a gene or a set of genes. Mutations are changes in the DNA sequence of a gene. They can happen at any time, from when you are a single cell to when we are old and white haired.

Some examples of diseases that may be carried along family lines are:

Diabetes	Cystic Fibrosis	Muscular Dystrophy	Lupus
Tourette Syndrome	Down's Syndrome	Huntington's Disorder	

There are many organisations that have been specifically set up to research genetic diseases, assess individuals and families at risk and advise them on choices to improve their lives. Such organisations promote regular screening for the disease and genetic testing.

Activity:

Each student has to find a support organisation for a chosen genetic disorder in Australia. They must write or type a business letter to that organisation requesting some information about the disease. The subsequent information should be presented to the class in a five minute speech.

Organisation

_____

_____

Address

_____

_____

_____

Employment Related Skills: Identify the employment related skills in the work and activities you performed in this section and complete a Classroom log sheet from your logbook.

Worksheet 5

DISCUSSION

In groups of four discuss one of the following questions:

Instructions: Elect a **team leader**, to ensure everyone offers an opinion and present your final decision, and a **scribe** to take down the main points raised by your group. You will be asked to present your group decision after 20 minutes.

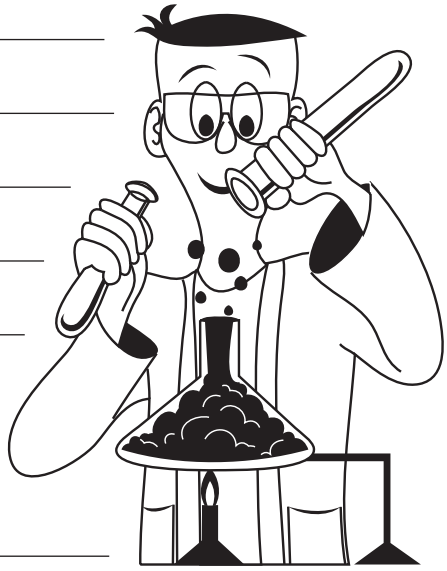
1. It is possible in the future that organs can be transplanted from animals, other than humans, into humans. This is called "xenotransplanting". If your brother's life depended on the liver from a pig or the heart from a baboon would you sign the form for the operation to take place, and why?
2. The cost of transplant surgery is around $34,000 for one heart recipient with an ongoing cost of around $15,000 a year. There are about 2000 people on transplant waiting lists in Australia. What if the money for transplants was spent in other ways such as researching and developing cures for diseases that affect many people or improving the health facilities in underprivileged communities or in public hospitals?
3. Even though Australians can nominate to donate their organs for transplant on their driver's license there are many more people in need of donated organs than there are organs available. What if one liver only becomes available for the following three people: a generous wealthy man, aged 68; a poor single mother of four, aged 34; a female medical student, aged 25. Who should receive the transplant?

Employment Related Skills: Identify the employment related skills in the work and activities you performed in this section and complete a Classroom log sheet from your logbook.

Worksheet 6

PREVENTION OR CURE

Internet Research: Thalidomide is a drug that was introduced onto the world market in 1957. It was prescribed to pregnant women, by their doctors, to combat symptoms associated with morning sickness. Research thalidomide on the Internet to find out what happened in the 1960s and write a short report on your findings.



Employment Related Skills: Identify the employment related skills in the work and activities you performed in this section and complete a Classroom log sheet from your logbook.

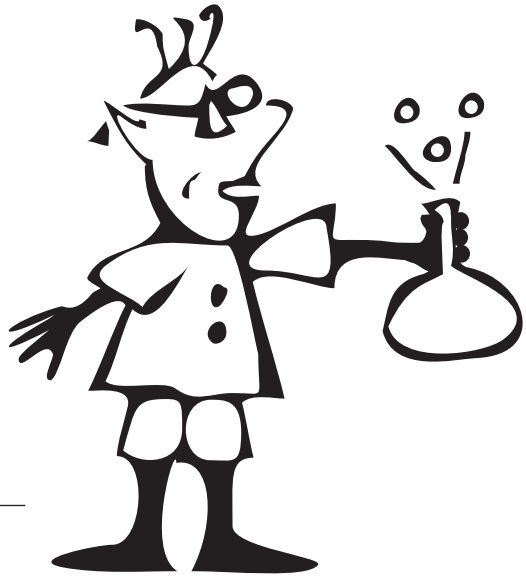
Worksheet 7

BIOTECHNOLOGY

Internet Activity: Using a search engine such as *Google* or *Yahoo*, research one example of biotechnology used in medicine that has changed the way we live and prepare a short report using Microsoft Word and pictures or diagrams.

Some examples you may choose from are:

- Bionic ear
- Coronary stint
- Antibiotics
- Vaccines
- Coronary pacemaker



Topic: _____

Notes:

Employment Related Skills: Identify the employment related skills in the work and activities you performed in this section and complete a Classroom log sheet from your logbook.

Worksheet 8

OUTBREAK AT SCHOOL

The scene: There has been an outbreak of a highly contagious and deadly disease at your high school. There are four students in a serious condition, three females and one male. Another 35 are showing symptoms of the disease that include bluish spots covering the face and hands and a blue tongue. Twenty-eight of those showing symptoms are female and all students are from Year 9.

Working in groups of four, it is your job to come up with a plan to first isolate the disease from the community and then devise a method to track down the source of the infection.

Consider the types of professional people who would be called in to assist with the problem.

Plan notes:

Employment Related Skills: Identify the employment related skills in the work and activities you performed in this section and complete a Classroom log sheet from your logbook.

Worksheet 9

STAYING HEALTHY CAREERS

There are many career opportunities directly or indirectly associated with "staying healthy" besides the obvious, nurses and doctors. Dieticians, fitness instructors and physiotherapists all require a good knowledge of the human body and how it functions.

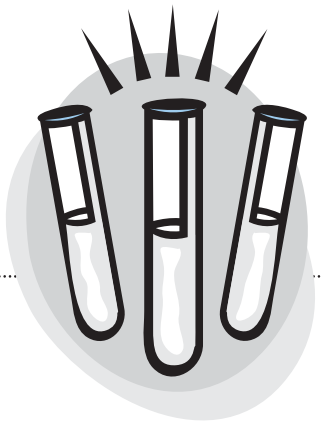
Work in groups of three, complete the table below with all the jobs you can think of that would relate to this topic and give a brief explanation of what you think they do.

Staying Healthy Occupations	Duties and Tasks/Work Conditions/Personal Requirements

Employment Related Skills: Identify the employment related skills in the work and activities you performed in this section and complete a Classroom log sheet from your logbook.

Worksheet 10

RADIOISOTOPES



Many of the chemical elements have a number of isotopes. The isotopes of an element have the same number of protons in their atoms but different numbers of neutrons.

In an atom in the neutral state, the number of external electrons also equals the number of protons. These electrons determine the chemistry of the atom. The atomic mass is the sum of the protons and neutrons in the nucleus. In the majority of cases, naturally occurring isotopes are stable, not radioactive and do not emit any form of radiation.

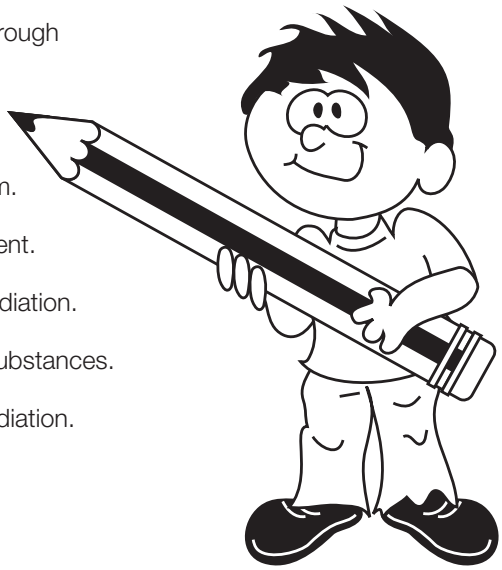
There are, however, a few chemical elements in the Periodic Table with isotopes that are unstable. Because of this, these elements emit radiation and are called radioactive. Isotopes that spontaneously emit radiation are called radioisotopes.

French physicist Henry Becquerel discovered the first radioactive substance in 1896. However, in 1898 Marie Curie, while working with her husband Pierre, isolated two previously unknown elements and coined the term “radioactive”. She called the first element Polonium, after her homeland Poland, and the second Radium, because of its intense radioactivity.

The seeds of Nuclear Medicine were first sown close to a century ago. Radium treatment of cancerous conditions was first demonstrated in 1901 in France. Nuclear medicine uses radiation to provide information about specific organs or treat disease. The thyroid gland, bones, heart, liver and many other organs can be imaged and disorders in their function revealed. In some cases radiation can be used to treat diseased organs or tumors. Radioactive products that are used in medicine are referred to as radiopharmaceuticals.

Instructions:

You will need a red, blue and black pen or coloured pencils. Read the text through individually and then mark the text to answer the following questions:



1. Underline in black pen the definition of an isotope.
2. Underline in red pen the particle that determines the chemistry of an atom.
3. Put a red box around the particle that determines the isotope of an element.
4. Circle in black pen the word we use to describe an element that emits radiation.
5. Put stars around the name of the scientist that first isolated radioactive substances.
6. Put a squiggly red line under the name used for treating diseases with radiation.
7. Put black boxes around two medical uses of radiation.
8. Circle in red pen the name given to radioactive products.
9. Name one radioactive substance.
10. How many years ago was the first treatment of cancer performed?

4. Education and Training Pathways in Science

4.1 Credit transfer arrangements

Credit transfer is the granting of advanced standing by institutions (either in the same or a different sector to the original institution) to students on the basis of previous study undertaken in another institution.

4.1.1 Credit transfer arrangements: HSC to TAFE NSW

Credit transfer arrangements negotiated between the NSW Board of Studies and TAFE NSW allows credit for study completed as part of the HSC.

To be eligible for credit transfer in a TAFE NSW course, students need to provide appropriate evidence of previous study or experiences at the time of enrolment. Credit is awarded depending on whether study and experience is relevant to a student's chosen TAFE NSW course.

Successful students will receive advanced standing into their chosen TAFE NSW course and complete fewer modules/ units making it possible to achieve a TAFE NSW qualification faster.

Credit transfer does NOT give automatic entry into a TAFE NSW course.

Further information about credit transfer for HSC courses can be found at: **www.det.nsw.edu.au/hsctafe/new**

Note: VET Industry Curriculum Framework Courses (ICFs) are based on units of competency. Students who study VET ICFs need to speak with TAFE NSW enrolling officers for information about the amount of module credit available.

4.1.2 HSC Science courses and credit transfer arrangements

Students who successfully complete the Science courses listed below, and who meet the conditions for credit transfer are eligible to receive credit for specified modules/units in some TAFE NSW courses.

It is recommended that teachers check the website **www.det.nsw.edu.au/hsctafe** regularly as changes to courses and credit transfer arrangements between the HSC and TAFE NSW may occur.

The following information is correct at the time of publication (June 2005).

Biology has credit transfer arrangements with the following TAFE NSW courses:

- Introduction to Tertiary Preparation
- Preparatory Mathematics and Science
- Tertiary Preparation
- Vocational Preparation.

Chemistry (Band 3 or Above) has credit transfer arrangements with the following TAFE NSW courses:

- General and Vocational Education (CGVE)
- Introduction to Tertiary Preparation
- Preparatory Mathematics and Science
- Tertiary Preparation
- Vocational Preparation.

Chemistry and Senior Science have credit transfer arrangements with the following TAFE NSW courses:

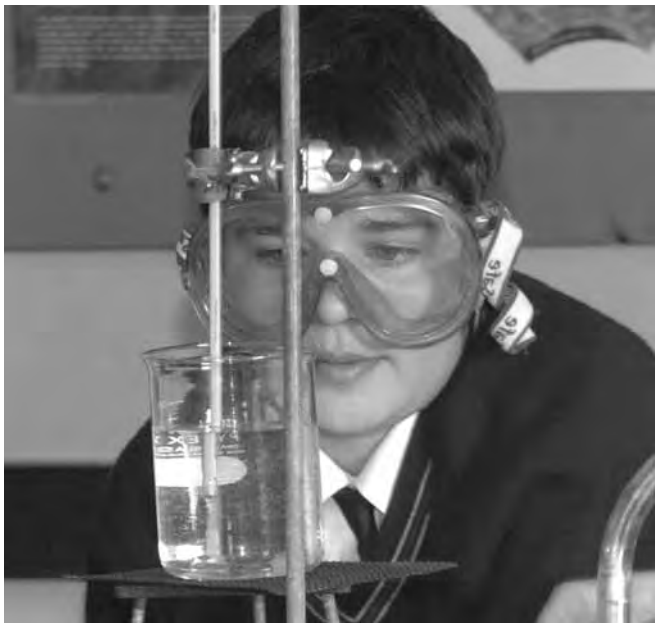
- Applied Science (Animal Science).

Earth and Environmental Science has credit transfer arrangements with the following TAFE NSW courses:

- Horse Industry Management
- Introduction to Tertiary Preparation
- Preparatory Mathematics and Science
- Tertiary Preparation
- Vocational Preparation.

Physics has credit transfer arrangements with the following TAFE NSW courses:

- General and Vocational Education (CGVE)
- Introduction to Tertiary Preparation
- Preparatory Mathematics and Science
- Tertiary Preparation
- Vocational Preparation.



4.1.3 *School Statement of Achievement* forms

Before a student can gain credit for some TAFE NSW course modules/units, a *Statement of Achievement* form is required. Listed below are the new HSC courses that require a signed *Statement of Achievement* form from the course teacher:

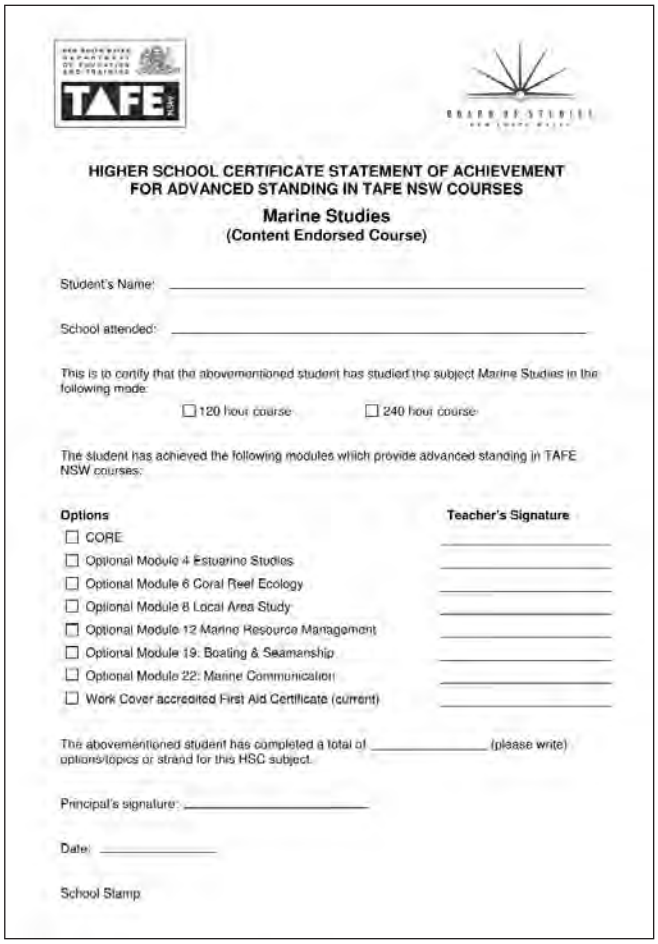
- Ceramics CEC
- English
- Industrial Technology
- Information Processes and Technology
- Marine Studies CEC
- Music
- Personal Development, Health and Physical Education
- Photography, Video and Digital Imaging CEC
- Software Design and Development.

All *Statement of Achievement* forms require the signature of the school principal and an official school stamp.

These statements can be downloaded from the TAFE NSW website:

www.det.nsw.edu.au/hsctafe/general/forms.htm

An example of a *School Statement of Achievement* form is shown on the right.



TAFE NSW

BOARD OF STUDIES NEW SOUTH WALES

HIGHER SCHOOL CERTIFICATE STATEMENT OF ACHIEVEMENT FOR ADVANCED STANDING IN TAFE NSW COURSES

Marine Studies
(Content Endorsed Course)

Student's Name: _____

School attended: _____

This is to certify that the abovementioned student has studied the subject Marine Studies in the following mode:

☐ 120 hour course ☐ 240 hour course

The student has achieved the following modules which provide advanced standing in TAFE NSW courses:

Options	Teacher's Signature
☐ CORE	_____
☐ Optional Module 4 Estuarine Studies	_____
☐ Optional Module 6 Coral Reef Ecology	_____
☐ Optional Module 8 Local Area Study	_____
☐ Optional Module 12 Marine Resource Management	_____
☐ Optional Module 19: Boating & Seamanship	_____
☐ Optional Module 22: Marine Communication	_____
☐ Work Cover accredited First Aid Certificate (current)	_____

The abovementioned student has completed a total of _____ (please write) options/topics or strand for this HSC subject.

Principal's signature: _____

Date: _____

School Stamp

4.1.4 Credit transfer from TAFE NSW to university

Students who complete a TAFE NSW diploma or advanced diploma course can apply for an undergraduate university course and may receive credit for subjects in that university course. This may allow students to complete their degree sooner.

Universities have different entry requirements for each course. Entry requirements can vary between universities and between courses. Applicants are considered on a case-by-case basis. Students should contact the university they want to enter for information about specific arrangements.

Further information on credit agreements between TAFE NSW and universities and course information can be found at:

www.sit.nsw.edu.au/courses

www.avcc.edu.au
(Policies and Programs/Teaching and Learning/Credit Transfer/Links with VET)

Note: Students should contact the relevant TAFE NSW institution for credit arrangements with universities and also check the university faculty/school handbook and website for current arrangements and requirements.

Listed below are ***some examples of credit arrangements***. They are a ***guide only*** to help teachers and students understand pathway planning options.

TAFE NSW Course (Sydney Institute)	University	Degree Course	Credit Arrangement
Diploma in Environmental Health and Building Surveying	Western Sydney – UWS	Bachelor of Applied Science (Environmental Health)	Up to 120 specified credit points or 50% of the degree
Diploma in Laboratory Technology (Biological – Environmental Testing)	Wollongong	Bachelor of Medical Science	144 credit point degree
Diploma in Laboratory Technology (Pathology Testing)	Wollongong	Bachelor of Medical Science	144 credit point degree
Diploma in Remedial Massage	Charles Sturt	Bachelor of Health Science (Complementary Medicine)	188 credit point package

4.2 Traineeships and apprenticeships

Traineeships and apprenticeships are jobs that combine paid work with formal training in a specific industry/occupation.

Apprenticeships and traineeships are available in most industries including:

- Arts and Entertainment
- Automotive
- Building and Construction
- Community Services and Health
- Communications
- Finance, Insurance and Business Services
- Food Industry
- Forest Industries
- Furnishing, Light Manufacturing, Textiles, Clothing and Footwear
- Manufacturing and Engineering
- Mining
- Primary Industries
- Process Manufacturing
- Public Sector
- Retail and Wholesale
- Sport and Recreation
- Tourism and Hospitality
- Transport and Distribution
- Utilities and Electrotechnology.

Apprenticeships generally last four years and cover traditional trade areas including aircraft, automotive, boat building, bricklaying, cookery, drafting, electrical, electronic, floor covering, green keeping, hairdressing, plumbing, saddlery, sign writing, stone masonry and wood machining. There are more than 100 apprenticeship vocations available in NSW.

Traineeships are offered in over 600 vocations and have been introduced to provide employment and training opportunities in a broader range of industry areas. Traineeships are shorter than apprenticeships, usually 12 months fulltime.

Examples of traineeships that may be of interest to students of Science include:

Utilities and Electrotechnology: Gas, Water and Electricity.

Automotive: Vehicle Servicing, Sales (Replacement Parts and Accessories *(This can be part of the T3 program for HSC students)*.

Process Manufacturing: Manufacturing (including cement, clay, plastics, rubber), Cable-making, Laboratory Skills and Techniques.

Primary Industries: Horticulture, Meat Processing, Racing (including greyhound, harness, thoroughbred and stable hand), Rural Skills (including Agriculture, Beef Cattle Production, Veterinary Nursing).

Mining: Coal Operations, Drilling, Extractive Industries.

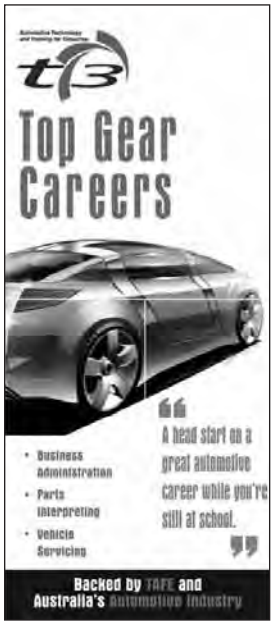
Manufacturing Engineering: Aeroskills (Aircraft Maintenance), Engineering Production, Engineering Technician.

Forestry: Forest and Forest Products including: Forest Growing and Management, Harvesting, Sawmilling and Processing, Timber Manufactured Products, Timber Merchandising, Pulp and Paper Manufacturing.

Food Industry: Food Processing, Meat Processing, Seafood (Fishing, Processing, Sales).

Community Services and Health: Aged Care Nursing, Out of School Hours Care, Youth Work, Ambulance Communications, Dental Assisting, Pathology Specimen Collection, Prosthetic/Orthotic Technology.

4.2.1 School Based Traineeships in NSW schools



School Based Traineeships provide students with increased opportunities to gain experience and qualifications in a particular industry while still at school.

Students are able to include a recognised VET qualification within their HSC and combine this with paid work.

Students successfully completing a School Based Traineeship receive:

- a nationally recognised VET qualification under the Australian Qualifications Framework
- Certificate of Proficiency
- credit toward the Higher School Certificate.

Generally, during Year 11 and 12, students spend the equivalent of three and a half days a week on their HSC program at school, one day a week in paid employment with their employer and a half day a week undertaking structured training either at school, TAFE or another registered training organisation.

- More information about current NSW traineeships and apprenticeships and School Based Traineeships in NSW schools can be found at the following website: **http://apprenticeship.det.nsw.edu.au/html/schavatrains.htm**
- The Commonwealth Government refers to all traineeships and apprenticeships as new apprenticeships. More information about new apprenticeships can be found at: **www.newapprenticeships.gov.au**
- Further information on School Based Traineeships is available from the Vocational Education in Schools Directorate website: **www.det.nsw.edu.au/vetinschools**

Over 50 traineeships are available for the School Based Traineeship Program. Industry areas include:

- Aeroskills
- Automotive (T3 – Vehicle Servicing, Parts and Accessories and Business)
- Business
- Electrotechnology
- Engineering
- Information Technology
- Retail (McDonald's and Big W)
- Property.

5. Vocational and Enterprise Learning Resources

5.1 Employment related skills and their elements

The employment related skills are as important as job-specific or technical skills. They are generic transferable skills. Students' development of these skills is integral to their ability to fulfil a successful life that incorporates education, work, relationships and recreational pursuits. The elements are the facets of the skills that will help teachers identify when students are demonstrating these skills. The depth and level at which students may demonstrate these skills will vary depending on the expectations of the activities undertaken and the age and experience of the student.

Employment Related Skills	Elements
Self-management – ability to take responsibility for setting and achieving personal goals	***Evidence of self-management can include a range of the following …*** • Setting goals and priorities that balance work and personal life • Monitoring and evaluating performance regarding personal goals • Building and maintaining a positive self-image to enhance confidence • Developing an eye for detail and being precise • Managing change by being flexible, open and responsive • Being proactive in career planning, time management and setting challenges • Managing various aspects of work and personal life, including health and fitness • Learning from mistakes and accepting feedback for continual improvement • Seeking out advice and support when required • Presenting in a manner suitable to the occasion • Developing competence in managing interpersonal and emotional relationships • Understanding, and being able to use, varying means for managing stress and conflict • Understanding the importance of managing time, and having preferred techniques for doing so • Understanding the importance of celebrating success and managing disappointment, and ways of handling these • Matching personal goals and capabilities to an undertaking • Knowing how to deal appropriately with persons in authority • Keeping a focus on the task and outcomes required • Dealing with people, problems and situations with honesty, integrity and personal ethics • Showing interest, initiative and effort • Being socially responsible and contributing to the community • Understanding the importance of reflecting and applying critical judgement • Carrying through an agreed responsibility • Accepting and providing feedback in a constructive and considerate manner.

Employment Related Skills	Elements
Initiative and enterprise – ability to seek/take advantage of opportunities	***Evidence of initiative and enterprise can include a range of the following …*** • Developing a strategic, creative, long term vision and actioning it • Identifying opportunities not obvious to others • Showing independence and initiative in identifying problems, generating a range of options and initiating innovative solutions • Exploring beyond existing boundaries to identify implications and learn from others • Understanding how society, government and business work, and the importance of active citizenship • Understanding what is meant by being enterprising, entrepreneurial and how to develop capacities for these • Understanding how to demonstrate initiative • Ability to manage risk and uncertainty • Willing to take risks and learn from mistakes.
Learning – ability to achieve new skills and/or knowledge	***Evidence of learning can include a range of the following …*** • Willingness to continuously learn and grow in a range of settings, taking into account preferred learning styles • Understanding one's own preferred learning style and working to develop other learning styles • Identifying and accessing learning sources and opportunities • Investing time and effort to acquire new knowledge and technology skills • Assessing personal strengths and areas for development • Exploring and understanding personal creative talents and how to make best use of them • Demonstrating personal and career oriented learning plans • Setting, managing and achieving learning goals • Using a range of mediums to learn – mentoring, peer support, networking, information technology (IT) • Being open to new ideas and techniques • Acknowledging the need to learn in order to accommodate change and build career paths • Being a member of and contributing to a learning community • Understanding the importance of learning new skills and acquiring new knowledge throughout life.

Employment Related Skills	Elements
Communication – ability to express and understand information	***Evidence of communication skills can include a range of the following …*** • Listening effectively and asking questions to understand and appreciate the points of view of others • Writing and speaking clearly, concisely, coherently and directly so others pay attention and understand • Reading and understanding information presented in a variety of forms (eg words, graphs, charts, diagrams) • Recognising the purpose of the communication and the needs of the audience • Sharing ideas and information using a range of information and communication technologies • Using relevant scientific, technical and mathematical knowledge and skills to explain or clarify ideas • Observing and recording data using appropriate methods, tools and technology • Having confidence in personal ideas and vision and being able to articulate these • Speaking and writing in languages other than English • Appreciating and understanding the role of non-verbal communication • Persuading and influencing others by inspiration, sensitivity and clarity • Establishing and using networks, both formal and informal.
Teamwork – ability to work effectively with others to get things done	**Evidence of teamwork can include a range of the following …** • Working as an individual and developing a rapport with others to form working relationships • Recognising and respecting the diversity, individual differences and perspectives of others • Understanding how to operate in a team • Understanding personal capacity for filling different team roles • Identifying the strengths of team members • Understanding how to assist others (eg coaching, mentoring and giving feedback) • Ensuring that the team's purpose and objectives are clear and establishing consensus on individual roles and responsibilities • Influencing, negotiating, collaborating, supervising, directing and motivating others to achieve a recognised objective (demonstrating leadership) • Managing and resolving conflict when appropriate and recognising the role of conflict in a group to identify issues and reach solutions • Understanding how to relate to other people in varying contexts, including those where they manage or are managed by others; and how to get things done • Respecting and being open to and supportive of the thoughts, opinions and contributions of others in a group.

Employment Related Skills	Elements
Planning and organising – ability to coordinate and prioritise tasks and resources	***Evidence of planning and organising can include a range of the following …*** • Developing a vision and a flexible pro-active plan to achieve it • Managing time and priorities – setting timelines, coordinating tasks for self and with others • Allocating people and appropriate tools and technology to tasks or a project • Being resourceful • Developing a range of techniques to locate, gather, assess and organise information using appropriate technology and information systems • Adapting resource allocations to cope with unexpected circumstances • Establishing clear project goals, deliverables and contingencies • Taking initiative and making decisions • Predicting – weighing up risk, evaluating alternatives and applying evaluation criteria • Collecting, analysing and organising information, using appropriate methods, tools and technology • Varying and adjusting one's approach or style according to situation demands • Making estimates and verifying calculations • Participating in continuous improvement and planning processes (monitoring and evaluating) • Evaluating the process and the product.
Problem solving – ability to identify problems and develop solutions	***Evidence of problem solving can include a range of the following …*** • Anticipating, identifying, clarifying and framing problems • Identifying the root cause/s of a problem • Developing and exploring practical solutions • Using mathematics including budgeting and financial management to solve problems • Testing assumptions taking the context of data and circumstances into account • Analysing and assessing information and situations quickly • Generating and using creative ideas and processes • Applying risk management • Seeking different points of view and evaluating them • Recognising the various dimensions of a problem (eg social, interpersonal, technical and environmental) • Deciding what needs to be measured or calculated • Readily using science, technology and mathematics as ways to think, gain and share knowledge, solve problems and make decisions • Evaluating solutions to make recommendations or decisions • Implementing solutions, then monitoring and evaluating • Maintaining an open mind.

Employment Related Skills	Elements
Technology – ability to use appropriate technologies to complete tasks	***Evidence of technology skills can include a range of the following …*** • Managing and using technology for a purpose in a given context • Having a range of basic information technology skills • Using information technology to manage and organise data • Applying occupational health and safety knowledge and practice to the use of technology • Displaying manual dexterity/fine motor skills when using technology • Applying technology to achieve work and leisure solutions • Achieving competence in handling information and communications technology and understanding the underlying processes • Understanding the social and ethical implications of technology and critically evaluating them • Being aware of technical challenges and constraints and having a plan for solving them • Understanding the role of technology in leisure and work • Understanding the implications of technology for productivity and business competitiveness.
Cross-cultural understanding – ability to respect diversity and act without discrimination	***Evidence of cross-cultural understanding can include a range of the following …*** • Recognising, valuing and respecting cultural, religious, linguistic and community diversity in local, national and global contexts • Identifying opportunities to use diversity to achieve agreed outcomes • Working effectively with people of diverse cultural, religious and linguistic backgrounds • Demonstrating an appreciation of the rights and responsibilities of individuals, groups and organisations within local, national and global contexts • Identifying how individuals and groups are interdependent on each other • Demonstrating sensitivity when interacting with individuals and groups from diverse cultural, religious and linguistic backgrounds • Working with others to achieve common goals which reflect equity and social justice • Recognising Australia's Indigenous heritage and its political, social, economic and cultural relevance • Identifying and overcoming stereotypes in life and work.

Personal attributes Personal attributes contribute to overall employability. They are a set of non-skill-based behaviours, attitudes and characteristics that contribute to a person's ability to achieve a successful life.	**Enterprise Education Learning Framework**	
	Key Qualities The enterprising learner is …	**Enterprising Characteristics** The enterprising learner …
• **Loyalty** • **Commitment** • **Honesty and integrity** • **Empathy** • **Assertiveness** • **Trust** • **Enthusiasm** • **Reliability** • **Personal presentation** • **Common sense** • **Positive self-esteem** • **A sense of humour** • **A balanced attitude to work and home life** • **An ability to deal with pressure** • **Motivation** • **Adaptability** • **Flexibility** • **Resilience** • **Determination** • **Self-reliance** • **Flexibility** • **Engagement** • **Connectedness**	**Connected**	• takes action that links learning to the real-world • communicates effectively • participates in the community.
	Engaged	• makes a head and heart contribution • is task oriented and outcomes focused • applies understanding to move forward • manages resources and time effectively.
	Resilient	• takes advantage of opportunities • actively monitors and responds to feedback • maximises capability and responds appropriately to setbacks.
	Responsible	• takes responsibility for own actions • has a sense of self-worth and belonging.
	Ethical	• contributes to the development of community values • acts in accordance with agreed values.

5.1.1 Employment related skills mapping

The table below maps the employment related skills (2005) against the employment related skills used in the *Employment Related Skills Logbook* (2002-2004) and the *Key Competencies* addressed in all NSW syllabuses.

NSW Employment Related Skills for Years 9-12 (2005)	Previous NSW ERS for Years 9 & 10	Previous NSW ERS for Prelim & HSC	Mayer Key Competencies
Communication *Ability to express and understand information*	Communication	Communicating ideas and information Negotiating and influencing	Communicate ideas and information Using mathematical ideas and techniques
Planning and organising *Ability to coordinate and prioritise tasks and resources*		Planning and organising Collecting, organising and analysing information Recruiting and managing resources	Planning and organising activities Collecting, analysing and organising information Identifying, assessing and managing risks
Teamwork *Ability to work effectively with others to get things done*	Leadership	Working with others and in teams	Working with others and in teams
Technology *Ability to use appropriate technologies to complete tasks*	Technological Physical		Using technology
Problem solving *Ability to identify problems and develop solutions*	Numerical	Solving problems	Solving problems
Learning *Ability to achieve new skills and/or knowledge*			
Self-management *Ability to take responsibility for setting and achieving personal goals*	Social	Matching personal goals and capacities to undertakings Monitoring and evaluating Being flexible and dealing with change	
Initiative and enterprise *Ability to seek/take advantage of opportunities*	Creative Practical	Using initiative and drive Generating and using creative ideas and processes Generating, identifying and assessing opportunities	
Cross-cultural understanding *Ability to respect diversity and act without discrimination*			Cultural understanding

5.2 Vocational learning resources for teachers and students

The following resources may be helpful to teachers and students who research careers and courses. Teachers and students may collect and add additional resources to this list.

Handbooks

- The most recent NSW DEST Job Guide **www.jobguide.dest.gov.au**
- The most recent version of the NSW UAC Guide **www.uac.edu.au**
- The most recent version of the TAFE NSW HANDBOOK **www.tafensw.edu.au**
- The most recent version of the HSC/TAFE Credit Transfer Guide **www.det.nsw.edu.au/hsctafe**
- The careers section of the most recent local/state newspaper.

Note: Schools located near other states should explore interstate handbooks.

Booklets

- *Aboriginal Career Aspirations Program*, Board of Studies. Distributed to schools 2002
- *Making Choices* (Work Sheets and CD-ROM) Career Education Association of WA.

Multimedia

Resource Title	Description
Logging The Real Game in NSW Schools – CD-ROM	This CD-ROM has been developed for teachers to help students identify and record their employment related skills acquired through participation in *The Real Game.* This is achieved by connecting *The Real Game* with the *School to Work Employment Related Skills Logbook* and shows how these two resources complement each other. *Logging The Real Game in NSW Schools* includes a series of support materials provided on CD, which allows both students and teachers to reflect on the outcomes achieved.
Logging on to the Future – CD-ROM	This resource promotes the usefulness of the *Employment Related Skills Logbook* to students, teachers, parents and employers. It demonstrates how the documenting of vocational skills by students throughout their school years can support them in interviews and applications.
School to Work Training 2003 – Video	The presenter, Paul Baker from TMP Worldwide, provides current information about the changing nature of the workplace, trends in employment and how this impacts on society. He focuses on the skills and competencies that will be required in future workplaces and then demonstrates how schools can help equip students to be better placed to meet the new and emerging world.

Resource Title	Description
JUMP TO IT: your guide to careers in the Sport and Recreation industry – CD-ROM	This resource covers the four sectors in the Sport and Recreation industry; community recreation, fitness, outdoor recreation and sport. It provides advice to students on steps they can take to research the Sport and Recreation industry and activities they can undertake to test their commitment and interest. A brief background to employment prospects and a profile on business people in the industry is supported by links to appropriate websites.
PowerUp – Your Career in Utilities and Electrotechnology – CD-ROM	This is an interactive, multimedia CD-ROM filled with information on today's Utilities and Electrotechnology industry opportunities. It profiles different workers in the industry and provides insight into their work and training. It incorporates video footage, sound and stills (graphics, photos), and text descriptions of the industry sectors being case studied, as well as links to other information, regarding employment opportunities and training.
WRAPS Careers: What Do You Want To Be? – Video	The aim of *WRAPS Careers: What Do You Want To Be?* is to provide careers advisers, VET teachers and students with information about careers in the Wholesale, Retail and Personal Services industries.
You Can Do I.T. ICT Careers Expo – Video	This video was filmed at the Information and Communication Technology (ICT) School to Work Information Day 2002. It provides Government school secondary students, careers advisers and parents with a range of available career and training options and current industry trends in the ICT field. The video also features interviews with students and ICT personnel in their workplace.
It's Your Business – DVD	This is a DVD resource for students who think that one day they might like to run their own business. It features: • video footage of four young people who are making it, working for themselves. They explain how they did it, the training they had and who helped them • an info bank with advice on how to get started, how to run a business and how to make it grow • quizzes to test individual suitability for business and the dos and don'ts.
Make It in Metal – CD-ROM	This CD-ROM provides information for people considering a career in the Metal Manufacturing and Engineering industry. It is suitable for use with students undertaking research or as a classroom resource. *Make It in Metal* allows students to meet young people in their workplaces, explore different industry pathways, test their knowledge about access to organisations and resources and learn about jobs.
Welcome To Hospitality – CD-ROM	This CD-ROM looks at a sample of the huge number of jobs that make up the hospitality industry, represented here by the hotel, motel, pubs, clubs and restaurant sectors.
Automotive Careers – CD-ROM	This CD-ROM resource provides information to students on a variety of automotive careers through text, video and still pictures. It is sectioned into the areas of Body Repairs, Mechanical Repairs, Sales and Careers.

Useful websites

www.curriculumsupport.nsw.edu.au/science
Science homepage of the Curriculum K-12 Directorate. Contains links to resources suitable for teachers of science.

www.sciencespot.net
A website with a range of activities in science including careers in science.

www.det.nsw.edu.au/vetinschools
The Vocational Education in Schools Directorate has developed this website for teachers, parents and students to provide information on and links to vocational education.

www.myfuture.edu.au
Australia's electronic career information service.

www.det.nsw.edu.au/vetinschools/schooltowork
Designed for teachers, this website supports the NSW Government's *School to Work Program*.

www.futurefinder.com.au
This website has a career interest test.

www.newapprenticeships.gov.au
A national website for traineeships and apprenticeships. This site contains the most up-to-date information on new apprenticeships including new apprenticeship centres in your region.

http://apprenticeship.det.nsw.edu.au
The Department of Education website lists up-to-date information and statistics on traineeships and apprenticeships in NSW.

www.seek.com.au
One of Australia's leading student and graduate employment and career resource websites, it contains over 35,000 jobs online. Do a 'quick job search' by typing 'Science' as keywords and discover a plethora of jobs available requiring Science skills.

www.workplace.gov.au
'Australian Workplace' offers information on employment, workplace relations, government assistance, jobs, careers, training and wages. It links to **www.jobsearch.gov.au/joboutlook** which contains occupational information such as job prospects and weekly earnings.

www.boardofstudies.nsw.edu.au
This website includes details of the Board of Studies Science curriculum.

www.det.nsw.edu.au
The Department of Education and Training has a 'Training and Industry' link to BVET, Apprenticeships NSW, VETAB, industry programs, training market and new apprenticeship centres.

www.det.nsw.edu.au/vetinschools/jobsalive
The *Jobs Alive* website enables students to read about the career pathway of a profiled worker. The site contains a photo of each worker when they were in Year 10. This helps students better understand that these workers were once their age facing similar decision-making issues.

http://girlswork.det.nsw.edu.au
The site looks at some different jobs in the form of Work Profiles, shares stories of other young women in *Your Stories* and discusses the different paths you can take between education, training, work and careers in *Pathways*. It helps young women explore their options using a variety of material including e-cards, a quiz, news and lots of links.

http://boyzatwork.det.nsw.edu.au
This website explores the broad range of work and career options available to young men. The *Champions* section has interviews with successful young men, *Jobz 4 the Boyz* looks at a number of jobs and careers that young men may not have considered and *Steer Your Career* shows there is more than one way to get from education and training to work and a career. Young men can consider their education, training and employment options by exploring this website and engaging in the quiz, e-cards, news and lots of links.

www.tafensw.edu.au/nsit/nsijobsforthegirls
This website displays images of eight young women in their workplace. The website has a case study on each of the eight young women that details their path into their chosen career. Better jobs and better pay means confidence and financial independence. The website hopes to interest young women in studying courses that will give them the skills and qualifications they need to pursue their career.

5.2.1 *myfuture.edu.au*

The *myfuture* website is a unique, comprehensive, online career information exploration service which is useful for school students and young people making decisions about subject choice, vocational pathways and employment.

The website allows users to refine their career ideas and to explore the skills and qualifications necessary for their desired career path. Information on awards, scholarships and financial assistance for study is also provided to enable users to shape their educational future.

As young people plan their transition from study to work, further education and employment, they can use *myfuture* to explore their interests and acquired skills and discover a variety of relevant career options. Some of these options may be completely new to them. *myfuture* also has information about the labour market, employment conditions and income data for any region of interest throughout Australia.

The detailed occupation descriptions in *myfuture* are very popular with young people. Young people can be better prepared for the workforce knowing what skills are required and what responsibilities and income to expect in particular jobs and careers. This can directly benefit employers, as new employees will have a higher level of confidence that the job they select is right for them.

Enterprising young people interested in identifying business opportunities and wanting to find out more about setting up a small business are also supported on the *myfuture* website.

For teachers, this website complements vocational learning activities in the classroom and is an innovative technological tool for students to explore career options relating to the eight key learning areas. The *Employment Related Skills Logbook* also features an introductory task to the *myfuture* website in the Student section.

With *myfuture*, career planning and development goes beyond the traditional tasks of selecting an occupation, getting a job, progressing in a single occupational field and planning for retirement. Articles and activities in *myfuture* include life planning and emphasise self-awareness, life long learning, career self-management and lifestyle management. Now go to **www.myfuture.edu.au** and explore the possibilities for yourself.

myfuture
Australia's career information service
myfuture.edu.au

5.2.2 *The Real Game Series*

The Real Game series consists of five developmentally sequenced career development and life skills programs. Each program in *The Real Game* series is a stand-alone teaching and learning tool which addresses the *K-10 Curriculum Framework* broad learning outcome: *Students will understand the work environment and have the knowledge, skills and understandings to evaluate potential career options and pathways.* The programs also encourage contemporary assessment for learning practices, provide student personalised learning opportunities and support quality pedagogy.

Each program includes creative role-playing and simulated activities. As a result, students have fun as they learn about life as an adult, exploring life and work roles in the context of their own career development and life planning. The five programs include:

The Play Real Game	suitable for ages 8 – 10
The Make It Real Game	suitable for ages 10 – 12
The Real Game	suitable for ages 12 – 14
The Be Real Game	suitable for ages 14 – 16
The Get Real Game	suitable for ages 16 – 18

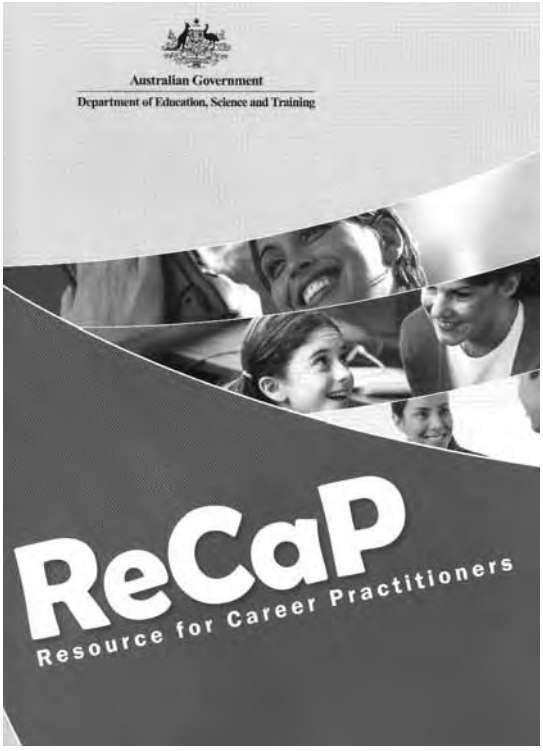
The Real Game series is underpinned by five internationally acknowledged career development themes known as the *High Five*, which have recently been incorporated into the draft prototype of the *Australian Blueprint for Career Development*. These principles are:

- **Focus on the journey**, not the destination
- Know yourself, believe in yourself and **follow your heart**
- You're not alone. **Access your allies**, and be a good ally
- **Change is constant**, and brings with it new opportunities
- **Learning is lifelong**, and it's good. We are most alive when we are learning.

A CD-ROM entitled *Logging the Real Game in NSW Schools* has been developed for teachers to help students identify and record their employment related skills acquired through participation in *The Real Game*. Other features of this resource include: *The Real Game* log sheet and the employment related skills certificate. The sessions and units of *The Real Game* have been mapped against the objectives and outcomes of Stage 4 NSW Board of Studies Commerce, English, Maths and PDHPE syllabuses to show how the program can address course delivery needs across a range of key learning areas.

To access the required teacher training or for more information on *The Real Game* series or *Logging the Real Game in NSW Schools*, contact your Vocational Education Consultant. For more general information about the series or to order products visit the Australian Real Game website: **http://realgame.dest.gov.au**

5.2.3 *Links to ReCaP*



ReCaP (Resource for Career Practitioners) is a quality teacher initiative under the *Australian Government Quality Teacher Program*. The resource provides careers advisers with information about current theories and policies relating to career development. It also provides the most up-to-date information about national programs, resources and materials, and has sections to enable users to include state, local and personal content. *ReCaP* was distributed to all NSW careers advisers in 2004.

The resource contains a series of student activities as black line masters for photocopying. A CD-ROM is also included with electronic versions of all worksheets that allow teachers to customise them to suit individual student needs. Worksheets can also be stored on a school's intranet.

The activities are aligned with the sections covered in the *Employment Related Skills Logbook* and would enhance students' entries and use of the logbook. The set of employment related skills outlined in *ReCaP* align with those listed in the logbook.

ReCaP can be downloaded from the following website: **www.dest.gov.au**

Home>Career Development>Publications & Resources>Publications A-Z>R>ReCaP:resource for career practitioners. Scroll down to Availability and click on HTML.

5.3 Enterprise resources and activities

For more information on enterprise activities and programs that students may wish to participate in, visit the websites listed below.

www.schools.nsw.edu.au/events/statecompetitions/webawards

The Department of Education and Training's Annual Schools Web Design Awards encourage teachers and students to become familiar with web design tools and to immerse themselves in communication technologies. Entering the awards is an excellent way of involving your school in these technologies. The competition is a fantastic way for students to create an educational resource for a world wide audience.

www.curriculumsupport.nsw.edu.au/technology/myda

The Minister's Young Designer Awards (MYDA) promotes innovative Stage 4 Design and Technology. The MYDA encourages students to look at the world around, to investigate products, systems and environments, and to design a successful solution in an area of interest to them. The awards are open to students in Years 7 and 8 in Government and non-Government schools in NSW, either as individual entries or as small group (maximum of six) entries. The challenge offered to students is to develop a project that meets a clearly identified need.

www.mindshop.com.au/mswebpage.nsf/pages/excellence

Mindshop Excellence is a five day work experience program aimed at Year 10 students. A team of six students will visit a host organisation. Facilitators will train students in business processes. Students will then be given a real workplace issue to solve over the course of the five days. The team will present their solution to management, staff, parents and teachers.

www.youth2youth.com.au

Youth 2 Youth run skill based workshops in school or outside school that equip young people with career, enterprise and business skills. They develop two free publications, *Frank* for young women and *Ignite* for all youth – they highlight opportunities, list contacts and provide inspiration for enterprising young people. The site provides youth information and hotlinks to many other sites.

www.anpf.cit.act.edu.au

Australian Network of Practice Firms. A practice firm is a virtual business set up and run by students with support from teachers and a mentor business partner. Practice firms trade in a virtual economy with other practice firms in the network and can attend and participate in trade fairs at a local, regional, state and national level.

www.takethechallenge.com.au

Energy Australia Red Cross Youth Challenge invites young people, their teachers and members of the community to take the challenge by finding a project that helps the community. Groups work together on a project gaining skills in project management, problem solving, research and communication. The site lists available projects or students can come up with their own.

www.sustainableliving.com.au

Sustainable Living Competition is an annual competition for high school students to undertake environmental projects in the classroom individually or by entire school communities. More than $30,000 in prizes.

www.yaa.org.au

Young Achievement Australia (YAA) offers two programs. Business Skills is aimed at Year 11 students. Groups of 20 to 25 students run their own business under the mentorship of a host organisation and take responsibility for all decisions. The program is run over 16 to 24 weeks generally outside school hours. Students can achieve a Certificate II in Business. Business Enterprise is for Years 8-10 students and introduces them to the world of business. Generally conducted in Commerce, Business or Work Education classes.

www.asx.com.au/sharegame

ASX Schools Sharemarket Game is available to students in Years 7-12. Students form a syndicate of two to four students. Each syndicate is provided with an imaginary $50,000 to invest in shares. This hands on experience of the share market will see you involved in internet "share trading" over a 10 week period.

www.austrade.gov.au/studentcentre

Austrade Export Plan Competition is a five week hands on unit where students study business with global potential. Students can apply business, economic and marketing theory and consider the global potential and small business opportunities in their own local area.

www.abw.org.au

Australian Business Week (ABW) offers students several programs. The in-school program is an intensive five day program (involving all Year 10 or 11) where groups of 10 students form a simulated company and assume the key roles of that company's employees. This culminates in the production and marketing of a product at a trade fair.

www.csiro.au/crest

CREST (Creativity in Science and Technology) provides students with a nationally accredited award for completing science or technology research projects. Projects are offered at different levels. Links are made with industry or community workers so students gain an understanding of the role of science and engineering in the community.

www.enya.org.au

The Enterprise Network for Young Australians (ENYA) promotes the active participation of young people (aged 15-30) in enterprise in an ethical and sustainable manner. It can assist them to set up their own enterprise by directing them to funding opportunities, mentors and training. ENYA has links to many other sites targeting youth.

www.govolunteer.com.au

Go Volunteer provides young people with all the information necessary if they are considering volunteering or seeking volunteer opportunities in their local area.

www.youthgas.com.au/about

Youthgas provides timely and accessible youth information/opportunities, a space for younger voices to be expressed and a place for people to share and learn about issues and concerns.

www.youngaustralians.org

The Foundation for Young Australians is committed to developing innovative initiatives that support and empower the lives of young Australians aged 12-25. They provide seed funding and help young people develop their ideas.

www.myownbusiness.org

My Own Business site is a free Internet business course on starting up and operating your own business. It offers resources, forum and chat, various courses and helpful information geared toward successful business.

www.highschoolstartups.com

High School Start Ups is designed to encourage enterprising young people. It provides useful information for students thinking about establishing their own business or a partnership business.

5.4 *Teachers in Business* – an opportunity for teachers

The *Teachers in Business Program* (TIB) provides teachers with work opportunities outside of school that will enhance their own industry/business experience and vocational learning. It will allow teachers to add value to curriculum delivery as they transfer the knowledge and skills learnt during the placement back into the classroom. It is also a means by which teachers can forge valuable links to industry for their school.

All teachers K-12 are eligible to apply for this program. Teacher relief is available to support teacher placements during school time. Teachers negotiate their placement with a suitable organisation or are 'matched' with the support of industry.

Teachers need to clearly outline how the placement will enhance their teaching. Examples include:

- Project management for leadership roles
- Business organisation
- Career pathways in a business or industry
- Examining new and emerging technologies in a specific industry area
- Event management that will assist in planning school or local events
- Examining ways in which industry and school can work together
- Examining services available to students when they leave school
- Investigating a range of support services for students with special needs
- Working with practice firm business mentor.

Teachers will be required to share their learning with others at the school, local or regional level.

Contact your local Vocational Education Consultant for the Guidelines and Application form.

Notes